



Natural History Museum Library



000196230

15.9.77

S 174 B

S.174.5.



No. 46



THE LONDON NATURALIST

the Journal of the
LONDON NATURAL HISTORY SOCIETY

Published : August 1967

Price : One pound . Post free

THE LONDON NATURAL HISTORY SOCIETY

WHATEVER your interest in natural history—even if you are still a beginner—the Society will welcome you as a member. You are offered a wonderful opportunity of extending your knowledge and increasing your enjoyment. The Society's Area lies within a 20-mile radius of St. Paul's and here most of its activities take place. Although so much of the area is covered with bricks and mortar it is a most exciting region with an astonishing variety of fauna and flora. The Society consists of Sections whose meetings are open to all members without formality. If you are interested in: ARCHAEOLOGY, BOTANY, ECOLOGY, ENTOMOLOGY, GEOLOGY, MAMMAL STUDY, ORNITHOLOGY, RAMBLING, or if you are a Young Naturalist there is a section ready to help you.

We offer you . . .

INDOOR MEETINGS

Nearly every week throughout the year with **Films, Lectures** and **Discussions** on all aspects of natural history.

FIELD MEETINGS

Led by experts, at week-ends and on summer evenings to visit "good" natural history places, often outside our Area. These excursions are very popular with beginners wishing to improve their knowledge.

PUBLICATIONS

The London Naturalist, published annually, a permanent record of the Society's activities, including records of plants and animal life in the London Area.

The London Bird Report, published annually, containing papers, facts and figures of special interest to bird watchers in London. Compiled by the Ornithological Section which also issues a bi-monthly *Bulletin* (5s. 0d. a year post free).

LIBRARY

A large selection of books and periodicals, many with special reference to London, now housed at Ealing Central Library and available for the use of members.

READING CIRCLES

Many important natural history journals enabling members who subscribe to these circles to read any of the journals at a fraction of the cost of an individual subscription.

UNIVERSITY LECTURES

With the co-operation of the University of London, Department of Extra-Mural Studies, courses of evening lectures during the autumn and spring. They are designed to meet the needs of members for more knowledge of any particular aspect of natural history.

MEMBERSHIP AND SUBSCRIPTIONS

MEMBERS	THIRTY SHILLINGS
JUNIOR MEMBERS	FIFTEEN SHILLINGS
FAMILY MEMBERS	HALF THE APPROPRIATE RATE
ENTRANCE FEE	FIVE SHILLINGS

All members except family members receive one free copy of *The London Naturalist* and *The London Bird Report*.

All details may be obtained from:—

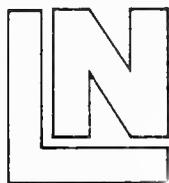
**THE GENERAL SECRETARY, MRS. L. M. P. SMALL,
13 WOODFIELD CRESCENT, EALING, W.5.**



THE LONDON NATURALIST

the Journal of the
LONDON NATURAL HISTORY SOCIETY

No. 46



World List Abbreviation: *Lond. Nat.*

Published August 1967 by the
London Natural History Society
and printed by F. J. Milner & Sons Ltd. Brentford and London



By kind permission of Cambridge University Press

HAROLD MUNRO FOX
(1889-1967)

CONTENTS

	PAGE
Harold Munro Fox (1889-1967)	<i>Frontispiece</i>
Officers for 1966	5
Editorial	6
Report of the Society for 1966	7
Botanical Records for 1966—J. E. Lousley	10
A Survey of <i>Calystegia</i> in the London Area: Fifth and Final Report—E. B. Bangerter	15
Botany Section Plant Mapping Scheme: Progress Report for 1966	23
<i>Pyrola Rotundifolia</i> in the London Area of Kent—Mrs. A. G. Side	24
Additions and Corrections to the Flora of Central London (3)— Douglas H. Kent	26
Notes on Some Middlesex Grasses—Douglas H. Kent	36
Notes on Mammals in the London Area for 1965—John A. Burton	40
The Fox in the London Suburbs—W. G. Teagle	44
Reptiles and Amphibians in the London Area 1965-1966—D. W. Yalden	68
Some Studies on Common Carp (<i>Cyprinus carpio</i> L.) and Crucian Carp (<i>Carassius carassius</i> L.) in a small Middlesex pond— David Marlborough	76
Hemiptera-Heteroptera of the London Area: Part IV—E. W. Groves	82
Notes on the Hymenoptera of the Bushy Park Area, Middlesex— J. C. Felton	105
Survey of Bookham Common: Twenty-Fifth Year Progress Report for 1966	110
Leaf Litter Fauna in the Ecology of Ground-Feeding Birds— L. Manns	116
Small Mammal Trapping at Bookham Common—K. A. J. Gold ..	126
Recent Excavations in Southwark and Lambeth—D. J. Turner ..	129
Conservation in the London Area, 1966—Daphne C. Hersey ..	139
Techniques in Ecological Surveys	142
Working Party on Mapping: Progress Report for 1966	143
Obituaries	144
Books	146
The Library	151
Periodicals in the Library of the London Natural History Society ..	152
Instructions for Contributors	159
Statement of Accounts	160

LONDON NATURAL HISTORY SOCIETY

Founded 1858

Honorary President:

Prof. H. MUNRO FOX, F.R.S.

Honorary Vice-Presidents:

J. B. FOSTER, B.A.; R. C. HOMES, M.B.O.U.

ERIC HOSKING, F.R.P.S., M.B.O.U.

Rt. Hon. LORD HURCOMB, G.C.B., K.B.E.

Miss C. E. LONGFIELD, F.R.G.S., F.R.E.S., F.Z.S., M.B.O.U.

E. M. NICHOLSON, C.B., M.B.O.U., L. PARMENTER, F.R.E.S.

J. H. G. PETERKEN, F.L.S., H. SPOONER

Officers for 1966

President: V. F. HANCOCK

Vice-Presidents:

E. B. BANGERTER, B. L. J. BYERLEY, F.R.E.S.

C. P. CASTELL, B.Sc., F.G.S., S. CRAMP, B.A., F.Z.S., M.B.O.U.

R. W. HALE, J. E. LOUSLEY

Honorary Secretary: T. R. MAYNARD, B.Sc., F.R.I.C.

Treasurer: A. J. BARRETT

General Secretary and Assistant Treasurer:

Mrs. L. M. P. SMALL, 13 Woodfield Crescent, W.5

Librarian: Miss H. BRITTON

Curator: B. L. SAGE, F.R.E.S., M.B.O.U.

Secretaries:

Advertisements—E. J. FURSE

Minuting—Miss M. E. KENNEDY

Programme—G. O. POTTS

Transport—W. G. SMALL

Editor, London Naturalist—R. M. PAYNE, F.R.E.S.

Assistant Editor, London Naturalist—PAUL A. MOXEY, B.Sc.

Editor, London Bird Report—F. H. JONES

Members of Council:

Miss E. P. Brown, J. G. Chipperfield, T. G. Collett, J. Crudass, J. Gooders, B.Sc., M.B.O.U., D. G. Hall, Miss M. E. Kennedy, R. H. Kettle, E. Milne Redhead, F.L.S., R. F. Moorman, F.G.S., P. E. Pickering, B.A., C. F. Sayers, P. J. Sellar, B.Sc., M.B.O.U., Miss H. M. Smith, Mrs. M. Waller, J.P.

Information about the Society may be obtained from the General Secretary

Editorial

NO Editor of an established journal, upon assuming office, can fail to be conscious of his debt to his predecessors. If the *London Naturalist* today is held in high regard, much of the credit must go to R. M. Payne, who was Editor from 1953 until last year. Only those who worked closely with him can fully appreciate the meticulous devotion which he gave to this journal during what was the longest Editorship in its history. Our Society is indebted to him for the way in which he maintained the high traditions of the *London Naturalist* whilst at the same time introducing those changes in format and style which have kept it up to date. Ronald Payne's departure from the London area deprives this Society of a devoted servant, but not natural history of a talented botanist and entomologist; he may be sure that he carries our good wishes with him and leaves many friends amongst us.

The death of the Honorary President should, strictly, have been reported in next year's *London Naturalist*, which is why it is not mentioned in the Society's Report. Professor Munro Fox's death, however, came so soon after the Annual General Meeting that it was decided to include an obituary, which appears on page 144, in this issue. A professional biologist of international standing, Professor Fox had been a member of the Society for many years and a keenly interested and active Honorary President since 1950. We are much the poorer by his death.

This year, the Bookham Common Survey attains the quarter century. It would be false to claim that it is the only long-term ecological survey being undertaken in this country, for the Wytham Woods Survey by Oxford University dates from 1942. Our own Survey, however, is unique as a sustained amateur effort, the results of which have made a considerable contribution to Science and illustrate that, even in an age of professional specialization, the amateur naturalist has an important rôle.

Today, as much as in the past, the distinctions between amateur and professional field biologists are blurred. What counts is not the occupational status of the worker, but the standard of the work. In this issue we publish W. G. Teagle's notable paper on *The Fox in Suburban London*, a credit not only to the industry of the writer, but also to the many L.N.H.S. members who supplied field data: the pages of this journal have, over the years, recorded many similar examples of the industriousness and talents of our members. It is our duty to maintain that tradition, for, ultimately, it is upon the efforts and co-operation of our members in the field that the achievements of our Society—and the standards of the *London Naturalist*—depend.

Report of the Society for 1966

THE membership of our Society now stands at 1,683 which represents an increase of 24 over the figure for the previous year. It is with deep regret that we record the deaths of the following members during the past year: Dr. A. Anderson, Miss A. Kenrick and Miss B. Nicholson.

Our Honorary President, Professor H. Munro Fox has been awarded the Darwin Medal of the Royal Society in recognition of his distinguished and extensive contributions in the field of invertebrate zoology and to the understanding of general biological phenomena.

The award to Stanley Cramp of the R.S.P.B. Gold Medal has been received with pleasure and satisfaction by members of this Society, of which he is a Vice-President, and has helped with his wise counsel over many years. There can be no doubt that, in years to come, we will have the pleasure of watching birds, many of which, but for his work as Chairman of the Joint B.T.O./R.S.P.B. Committee on Toxic Chemicals, would have been selfishly and thoughtlessly destroyed. We are also pleased to record that James Fisher is this year's recipient of the Bernard Tucker Medal of the British Trust for Ornithology and that Professor E. H. Warmington has been appointed Vice-President of Birkbeck College.

The proposals relating to the future use of the Lee Valley have occupied the attention of a Committee of the Council for Nature, which grew out of a working party originally set up by this Society. A report has now been presented to the Greater London Council setting down suggestions for the establishment of nature reserves and field centres in four areas of the Valley. The Advisor to the Lee Valley Authority gave the members of the Committee a sympathetic hearing and discussed the proposals fully, explaining the implications resulting therefrom. In short, the areas suggested were Rye Meads, Broxbourne, Nazeing Marsh and Turnford, with Field Centres being an integral part of those at Rye Meads and Nazeing.

The conflicting demands for space and facilities in the Valley makes the task of the Authority extremely difficult but we continue to hope that natural history interests will not be overlooked.

The Society's colour film "London's Birds" was shown at three venues during the past year. There was another public showing at the New Gallery Centre, Regent Street on April 26 as our contribution to National Nature Week; in addition the film was shown to the Natural History Society of Northumberland, Durham and Newcastle upon Tyne at the Hancock Museum in November and at the International Ornithological Congress held at Oxford during July. We felt particularly honoured that our film should be selected for showing at the Congress and would like once again to record our thanks to the commentators, Mr. S. Cramp at the New Gallery Centre and the Congress, and Mr. W. D. Park at the Hancock Museum, for their efforts on behalf of the Society.

A Recording Maps Working Party has been instituted, with Mr. H. A. Sanford named as Maps Officer to consider methods of recording and publication in map form and to co-ordinate the mapping activities of sections and members. They are hoping to devise a method of producing in one operation maps and overlaps suitable for all purposes such as restricted distribution, publication in the *London Naturalist* or a distribution atlas for our area.

Our Archaeological Section has enjoyed another full programme of meetings this year. Among the successful outdoor meetings was an excursion to Reading in conjunction with the Thames Basin Archaeological Observers Group to see Reading Abbey and the Museum of Rural Life. A visit to Forty Hall, Enfield, to see the seventeenth century hall, included a guided tour of the current year's excavations of the Tudor Elsynge Palace in the grounds of the Hall.

In May the section made a trial inspection of a site at Madron Street, Southwark with an auger in a search for part of the Roman London-Dover Road. No evidence of the road was found at this site but it is hoped to use this technique again next year on other areas in Southwark due to be cleared for redevelopment.

This has been the second year in which the Botany Section have continued with the Plant Mapping scheme and much tetrad recording has been done. It is hoped that all members who can will give their support to this operation so that the whole of our area will eventually be fully covered. The *Calystegia* survey is now completed and it is hoped to publish the results in the next issue of the *London Naturalist*.

The nineteen field meetings included a weekend outing at Whitsun to Teesdale to see the rare flora of that area now threatened by inundation in the construction of a new reservoir.

The Ecological Section has continued to take an interest in those topics of natural history not specifically covered by other Sections. Further papers on the distribution of such little studied fauna as reptiles, amphibians and fishes are planned for the future, but this type of work can only succeed with the help of individual members, who are urged to send their field observations to the Sectional Recorders.

Have the many excellent television programmes on insects which have been shown during the past years led to an increase in the number of people interested in Entomology? Our Section believes that this may be so and is planning more informal meetings in the future with an emphasis on practical demonstrations of identification.

Last year reference was made to the formidable task of producing check lists of insects for the London Area, and some of the fruits of this endeavour are seen in this issue of the *London Naturalist* with a second paper on Hemiptera, and a further list of Diptera taken on Bookham Common.

The Epping Forest Field Section organised sixteen forays into the Forest this year covering a wide range of Natural History interests. There was a slight fall in the average attendance which could be ascribed to the rising cost of transport.

The programme of field meetings organised by our Geology Section this year included coach trips through Berkshire and to the Isle of Sheppey, as well as outings to Wrotham, Dover, Hampstead Heath and to Bishops Stortford for the glacial gravels. Visits were made to the British Museum (Natural History) to see two demonstrations; one on Fossil Man and the other on Ostracods and Conodonts.

After being in abeyance for some years it has been decided to continue with the Temporary Excavations recordings to deal with transient exposures of geological interest in our Area and Mr. J. Hollis will be primarily responsible for this activity.

In addition to an excellent programme of lectures and field meetings, the Ornithological Section has continued its policy of organising social occasions and the Annual Dinner held at the Rembrandt Rooms was a great success. Attendance at informal meetings too has been better than ever before, ranging from 30 to 60 members.

As one of the primary functions of this section is the recording of events and changes of Ornithological significance a Working Party has been set up to assess the coverage within our Society Area and to consider ways of stimulating and maintaining interest in this important aspect of the Section's activities.

At least once in every month of the past year the Ramblers have held an outdoor meeting when places of general interest to members are visited. The attendance has been good, particularly on the Saturday outings and the varied list included such venues as St. Paul's Cathedral, Knole, Blenheim, the Guildford Flower Festival and Hughenden Valley.

The South West Middlesex Section suffered a severe loss this year in the death of their Chairman, Dr. A. Anderson, who has played a central part in their activities for many years. Their outdoor meetings included visits to Ash Vale and Box Hill where six species of orchids were seen.

Botanical Records for 1966

Compiled by J. EDWARD LOUSLEY

IT is thirty-four years since there have been two successive summer seasons as wet as those of 1965 and 1966 over England and Wales. The total rainfall for London (St. James's) in 1966 was 29.26 inches which is 125% of the average and much of this fell in summer. On July 5 totals of more than 2 inches were recorded in the Home Counties. There were no really warm spells in the south-east after the first week in June, and the season was characterised by high pond levels, cool conditions, and slow plant growth. It was some consolation that we escaped severe autumn frosts so that even some quite tender species survived until the end of the year.

In spite of these discouraging conditions excellent progress was made with the new scheme for mapping the flora of the London Area on the basis of the National Grid (see page 23) and the flow of discoveries of plants of special interest continued at the rate to which we have become accustomed. The rare club-moss, *Lycopodium clavatum*, found in Kent by Mrs. A. G. Side in 1965, has now been found by R. Clarke and E. J. Clement in two new places in Surrey and in one of them it extended for half-a-mile to the Kent boundary. These, with other records from outside our Area, suggests that this species is suddenly increasing and it is tempting to infer that this may be connected with climatic changes. A first class discovery from Surrey by B. Wurzell is a large colony of great yellow-rattle, *Rhinanthus serotinus*, which is new to the London Area and has seldom been seen in southern England.

Most members contributing records are now supplying full National Grid or tetrad references, and these are entered in the card index. In this report 10-kilometer squares are cited in brackets following the place names. The nomenclature is based on the *List of British Vascular Plants* (1958) prepared by J. E. Dandy, and for species in that *List* authors' names are omitted to save space.

V.-c. 16, WEST KENT

The useful list contributed by R. M. Burton included especially interesting records from a meadow near Foots Cray (47) where he found *Dactylorhiza praetermissa*, *Blysmus compressus*, *Carex disticha*, *Helictotrichon pubescens* and *Catabrosa aquatica*. The orchid was also reported by R. A. Boniface who records *Juncus subnodulosus* from the same locality. Other records from R. M. Burton include *Artemisia verlotorum* from Lewisham (37) and *Hypericum maculatum* from near "The Birches", a mile south of Eynsford Station (56). The notes sent in by B. Wurzell include *Salix daphnoides* from by a gravel pit at Darenth (56) and "thousands of seedlings and saplings" of *Acer platanoides* from a road near Green Street Green (46). He is to be congratulated on his persistence which led to confirmation of his discovery of *Euphrasia confusa* from Dartford Heath (57), thus adding another species to the London Area. He first found this in 1962 but, on the material collected, Dr. P. F. Yeo of Cambridge could only give a tentative determination. Further specimens were collected in 1964, and confirmed by Dr. Yeo in 1966, and Mr. Wurzell has now found that this rare eyebright is locally quite plentiful.

From J. R. Palmer a useful list includes many aliens, of which the shrub *Euonymus latifolius* in the middle of Cuckoo Wood (46), and maidenhair fern, *Adiantum capillus-veneris*, reproducing on greenhouse walls at a nursery at Crockenhill (56) are of special interest. G. M. Brown has carried out a most interesting search for plants recorded from Shooter's Hill district in De Crespigny's *New London Flora* of 1877. Some 21 species were refound including *Trifolium arvense* on Woolwich Common and *Medicago arabica* in Hornfair Park. A Surrey colony of *Lycopodium clavatum* (see below) was traced into Kent near Rook's Nest (45) by R. Clarke.

V.-c. 17, SURREY

The outstanding record from Surrey in 1966 was undoubtedly the discovery by B. Wurzell of *Rhinanthus serotinus* in abundance on a chalky slope opposite Devil's Den Wood, Coulsdon (35). This large colony of yellow rattle has been known to other botanists for some years and passed over as the common species, and it is a great credit to Mr. Wurzell that he identified the plant correctly, and his identification was confirmed by Dr. D. J. Hambler. *R. serotinus* grows on downland from which aliens have been recorded, but these were not in the immediate vicinity, and there is no evidence to suggest that it is not native.

An almost equally important record is that of *Sanguisorba officinalis* found by Mrs. C. Arcus growing with meadowsweet in a rough field near the River Hoggs Mill at Ewell Court (26). When she returned to show the plant to E. J. Clement a little later the meadow had been cut, but nearby they found *Hordeum secalinum*, *Petasites hybridus*, *Glyceria plicata* and *Cyperus longus* which was spreading as a naturalised plant along a stream in the grounds of Ewell Court. R. M. Burton reported *Valerianella carinata* from Backlane near Merstham (25), and Mrs. E. Briggs found many plants of *Littorella uniflora* in flower at Leg of Mutton Pond, Richmond Park (17)—our first record from the London Area since 1935.

In June, D. McClintock drew my attention to a truly enormous plant of henbane, *Hyoscyamus niger*, with other interesting plants on waste ground by Royal Festival Hall (38) and in a short visit I listed 89 species. These included *Rorippa sylvestris*, *Vaccaria pyramidata*, and *Hieracium cheriense* Jord. ex Boreau, which was determined by Dr. C. West. From Ham (17), Miss K. M. Marks reported *Lathyrus tuberosus* and *L. hirsutus*, and in the gravel pits she was shown *Trifolium subterraneum* by Miss D. Meynell, and with Mrs. I. Chatterton she collected a *Genista* which was named *G. tenera* (Jacq.) O. Ktze. at Kew. On a building site at the south end of Waterloo Bridge (38) R. M. Burton found *Stellaria graminea* and *Centaurea nigra*, and on the river wall just north of Vauxhall Bridge (37) Lady Anne Brewis found *Angelica archangelica*.

In furtherance of our policy of filling gaps in distribution by listing the plants of private ground, Lady Anne Brewis, E. J. Clement, and R. Clarke joined Dr. D. P. Young in a visit to Nine Elms Goods Yard. The list of plants they found included two very interesting grasses: *Agrostis scabra*, which was dominant over some 50 yards of trackway, and *Digitaria sanguinalis*, of which there were many plants over a few feet of trackway. R. A. Boniface reported \times *Festulolium loliaceum* from a meadow near Ham (17) and *Hieracium pulmonarioides* from an old wall near Ham House (17) where he had known it since 1960, and his specimen was determined by Dr. C. West.

V.-c. 18, SOUTH ESSEX

The only records received from this vice-county came from B. Wurzell. They include *Bromus inermis* Leyss., a grass which seems to be spreading, from a bank at Walthamstow Reservoirs (39), where he found it in 1965. In Walthamstow Marshes (38) he found *Carex rostrata* and *C. spicata*—both new to our records from Essex, and on a derelict pre-fab. site at Lea Bridge Road (38) he recorded water avens, *Geum rivale*.

V.-c. 19, NORTH ESSEX

No records received.

V.-c. 20, HERTS.

Miss M. Kennedy contributed a number of useful records including *Hypericum montanum* from Little Berkhamstead (20), *Lathyrus latifolius* from Hoddesdon (30) and Northaw (20), *Rapistrum rugosum* from Smallford (10) and Hoddesdon (30), and *Festuca tenuifolia* from Smallford (10). John Mason collected *Festuca tenuifolia* forma *aristata* (det. C. E. Hubbard) from the Great North London Cemetery, East Barnet (29). E. B. Bangerter had several interesting plants at East Barnet (29) including *Leontodon taraxacoides* from school playing fields, *Symphytum* × *uplandicum* from near Pymms Brook, and *Linaria purpurea* from waste ground. Donald Hinson reported *Elodea ernstae* St. John from Hadley (29). From south of Totteridge (29) B. Wurzell contributed *Fritillaria meleagris*, of which he found several dozen in private woods. The locality may be an old one rediscovered, and it is certainly very near to some of the old ones, but the fritillary is not normally a plant of woodland, and here it was growing with *Narcissus majalis* and much *Myosotis sylvatica*.

V.-c. 21, MIDDLESEX

During 1966 Middlesex was by far the best worked part of our Area, thanks to the field work of Mr. Kent and his friends. For the rare dock *Rumex palustris* there were no less than six records during the year, and many new localities for *Veronica filiformis* revealed it as especially a Thames-side species. This is an excellent example of the standard we hope to achieve; when a species is fairly fully recorded an interesting distribution pattern will often emerge; with only a few records we cannot hope to detect such patterns.

In central London we continue to receive records of interest for the places where they are found. Thus in Stag Place, Victoria (27), D. McClintock found *Gnaphalium uliginosum*, *Galeopsis bifida*, and *Daucus carota*, while the male fern, *Dryopteris filix-mas* was reported by Mrs. P. A. Moxey as growing on Hungerford Bridge (38). She also noticed *Ribes nigrum* on the bank of the old railway at Highgate Wood (28), and *Montia siberica* in Turner's Wood, Hampstead (28). J. R. Palmer reported the grass, *Festuca heterophylla* as naturalised in woodland on Hampstead Heath (28).

Mr. Kent's own records included numerous species which were new or had not been seen in recent years. On the Thameside at Laleham Park he found a small patch of *Allium schoenoprasum*, in Littleton Lane near Shepperton a small quantity of *Cruciata laevipes* which is now a very rare species in the county, and at Halliford House, Upper Halliford, sweet chestnut, *Castanea sativa*, was regenerating (all 06). On a railway side near Denham (08) he saw *Barbarea intermedia*, which Dr. D. E. G.

Irvine also found on a railway embankment near New Southgate Station (29). On Hounslow Heath close to Feltham, Mr. Kent recorded *Picris hieracioides*, and, near Boston Manor Station, *Tragopogon pratensis* subsp. *pratensis*, while with A. R. W. Tyrrell he reported *Anagallis arvensis* var. *carnea* Schrank from disturbed ground near Hampton, and *Rumex patientia* and *Euphorbia cyparissias* from a meadow near Half Moon Covert, Kempton Park (all 17). He found *Phytolacca americana* on waste ground near Wembley Park Station, *Astrantia major* well established in the grounds of Eastcote House and Haydon Hall, *Sedum album* on an old wall in Hayes Park and *Polypodium vulgare* L. sensu stricto on a wall by Hillingdon Church, and, with H. W. Temple, in Harrow on the Hill churchyard (all 18).

Mr. Kent found a small colony of that increasing garlic, *Allium paradoxum*, with A. R. W. Tyrrell on Whitchurch Common, Stanmore (19) and a single plant of *Medicago minima* on the North Circular Road, Neasden (28). A small colony of welsh poppy, *Meconopsis cambrica*, was noticed with Miss M. E. Kennedy at Whetstone Stray (29), and several fine well established colonies of *Rumex triangulivalvis* on waste ground at The Highway, Shadwell (38). This is an exceedingly interesting record, since I noticed it there in 1945, and Mrs. L. M. P. Small in greater quantity in 1951. It seems likely that this North American dock may have persisted at Shadwell for at least 21 years. Mr. Kent and Miss Kennedy visited the grounds of Myddleton House, Enfield (39) which was the home of the famous horticulturalist E. A. Bowles for many years. The garden plants persisting included the tiny Corsican mint, *Mentha requienii*, which was established on a gravel path, *Linaria repens* as an abundant weed, and *Geranium platypetalum*, *G. pratense*, and *G. endressii* abundantly naturalised. A solitary large plant of the native orchid *Epipactis purpurata* was seen in a wooded enclosure. Near Enfield Lock (39) they found *Lathyrus tingitanus* and *L. aphaca*, and in wet marshy ground north of this, *Puccinellia distans* growing with *Triglochin palustris*.

Interesting Middlesex records contributed by R. A. Boniface included *Bromus diandrus* by Brentford Church, *Chenopodium hybridum* in two places at Brentford, and *Polygonum mite* by the pond at Syon House, and at Chiswick (all 17). On Hounslow Heath old tip (17) B. Wurzell noticed *Dipsacus sativus* and *Melilotus sulcata* Desr., and on the new tip, *Setaria lutescens*—the latter he also found as a weed in a shrubbery in Kensington Gardens (28?). A single plant of the sweet-scented orchid, *Gymnadenia conopsea*, found on Northwood Golf Course (09) in 1965 by J. Moore was grubbed up a few days after its discovery—a not unusual fate for newly discovered orchids in our Area. Another orchid, *Epipactis phyllanthes*, confirmed by Dr. D. P. Young was found in a small covert on Harefield Moor (08) by S. E. Crooks. This is a much smaller colony than the one at Harefield (09) several miles to the north recorded earlier by B. P. Pickess. We are grateful to Dr. D. E. G. Irvine for several mapping cards and his more uncommon plants include *Epilobium lanceolatum*, named at the Natural History Museum, from waste ground at Holloway (38), and *Hieracium lepidulum*, named by P. Sell and Dr. C. West from New Southgate (29)—both 1965 records.

From Harefield Grove Farm (09) I. G. Johnson reports a number of old but very diseased trees of *Sorbus torminalis* and Miss M. E. Kennedy found the hybrid woundwort *Stachys* × *ambigua* (named by D. H. Kent) at Enfield Chase (39). With C. P. Castell at Trent Park, Southgate (29)

she found *Quercus borealis* Michx.f. var. *maxima* (Marsh.) Ashe (det. D. H. Kent) planted but regenerating from seed. We would very much like to receive more records of alien trees spreading by seed—as no doubt many of them do. In a cemetery at Teddington (17) E. J. Clement found one plant of *Antirrhinum orontium*, and at Hampton Court (16) he had three first-class finds: *Juncus compressus* grew for several yards near the Bridge, *Poa palustris* in two places about a quarter of a mile apart on the river bank down river from Hampton Court.

V.-c. 24, BUCKS.

A few additional records were received from this small part of our Area. The most interesting was *Carex pallescens* found by R. M. Burton and Miss M. Kennedy in a wood north of Denham (08).

We are grateful to the following for their contributions to our records during the year: Mrs. C. Arcus, E. B. Bangerter, R. A. Boniface, Lady Anne Brewis, Mrs. E. Briggs, G. M. Brown, R. M. Burton, C. P. Castell, Mrs. I. Chatterton, R. Clarke, E. J. Clement, T. G. Collett, S. E. Crooks, Dr. and Mrs. J. G. Dony, R. J. Edwards, Dr. D. J. Hambler, D. Hinson, Dr. C. E. Hubbard, Dr. D. E. G. Irvine, I. G. Johnson, Miss M. E. Kennedy, D. H. Kent, J. E. Lousley, D. McClintock, Miss K. M. Marks, John Mason, Miss D. Meynell, Mrs. D. Missen, J. Moore, Mr. and Mrs. P. A. Moxey, Mr. and Mrs. A. F. Mussellwhite, J. R. Palmer, H. M. Pratt, P. Sell, Mrs. A. G. Side, Mrs. L. M. P. Small, Mrs. J. E. Smith, H. W. Temple, A. R. W. Tyrrell, Dr. C. West, B. Wurzell, Dr. P. F. Yeo, Dr. D. P. Young.

A Survey of Calystegia in the London Area

Fifth and Final Report

By E. B. BANGERTER

INTRODUCTION

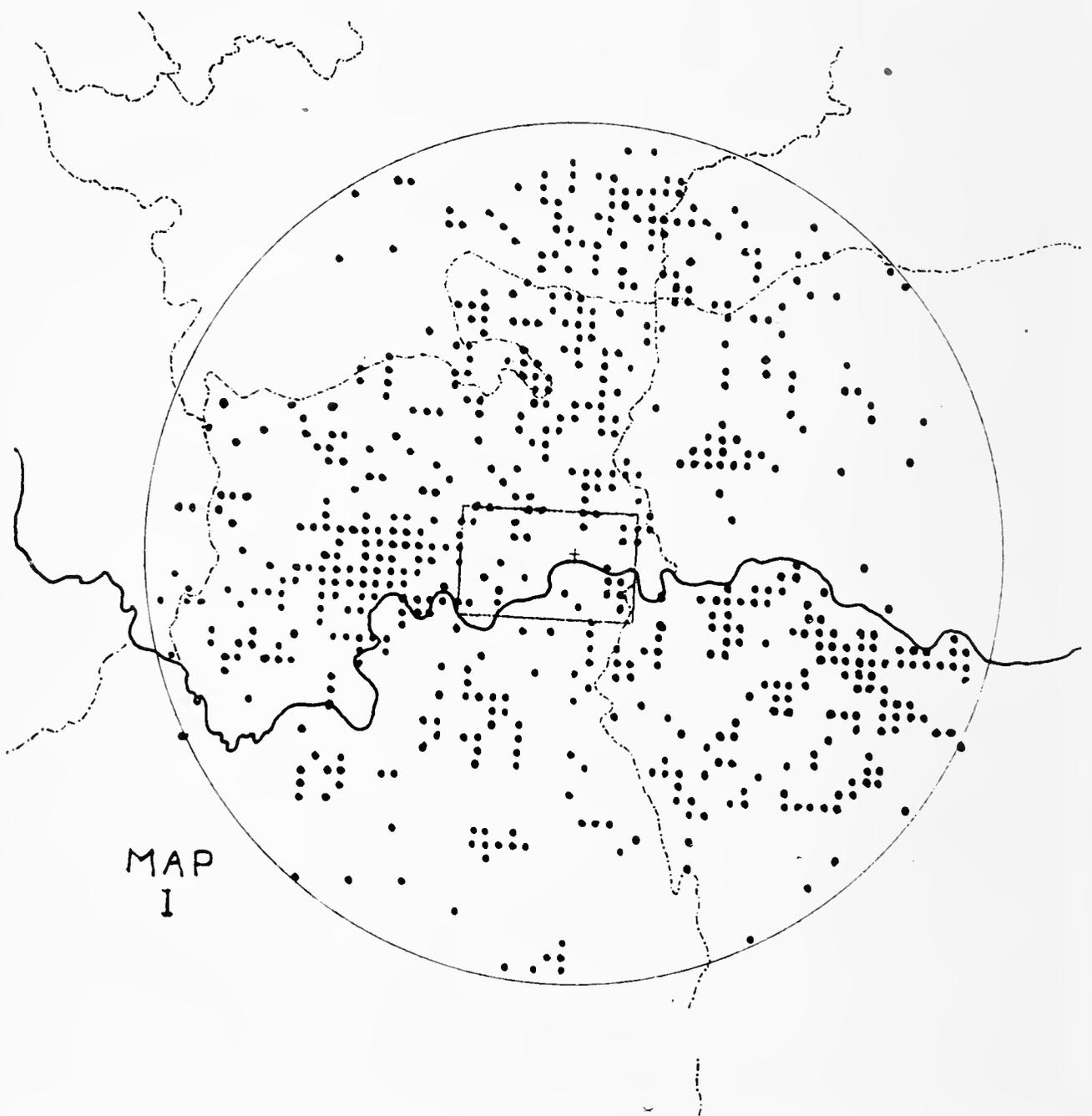
C. A. STACE (1961) published a paper outlining a simple statistical method, "a modified Anderson Hybrid Index", to separate two species of bindweeds and to enable hybrids between them to be recognised. He describes an experiment, based on this method, on populations of these plants in the Tunbridge Wells area. Reference is made to this work by D. H. Kent (1962) in a note inviting members to participate in a survey of populations in the London area to determine the distribution of the two species and the intermediate. He describes the species, *Calystegia sepium* (L.) R. Br., our native hedge-bindweed, *C. silvatica* (Kit.) Griseb., an introduction from South-east Europe, and the hybrid *C. X lucana* (Tenore) G. Don. Kent announced that individual recording cards were available for volunteers. P. C. Holland (1963) published the first Progress Report and E. B. Bangerter (1964, 1965, 1966), who had undertaken to collate all data, published the second, third and fourth; these were mainly factual accounts of number of cards received, extension of areas covered, increase in number of recorders and so on. The last author, in addition, appended in the fourth Progress Report a habitat analysis and a list of associated species. Holland prepared in 1964 and distributed to all helpers a duplicated sheet of instructions based on two years' experience of work in the field. The intention of the Botany Section, in initiating the project, was to publish maps showing the distribution of the three taxa in our area.

METHOD

The recording cards gave provision for four measurements (in mm.) to be entered for each of six flowers from any one colony: the length of corolla, the diameter of the bracteoles from mid-rib to mid-rib, the diameter (*in vivo*) from side to side and the width of the larger bracteole when flattened out. No attempt at identification was invited. Colour of flower—white, white with pink veins, all pink—could be indicated by putting a tick in the appropriate one of three boxes. On the reverse side of the card space was provided for locality with grid reference, habitat, date and recorder's name. Completed cards were sent to Bangerter, who applied the method devised by Stace in his paper (to which reference should be made by readers interested in the details) and, having determined the TS (total scaled) value for each colony, sorted the cards topographically. Following Stace's method, all colonies with TS values 5–12 were plotted on a map as *C. sepium*, all with TS values 23–32 as *C. silvatica* and those between as hybrids. At the same time a map was marked showing all the 1 km grid squares visited; this map gave an indication of coverage of the area by the survey and was exhibited at meetings to encourage further recording.

As the survey progressed, however, it was noted that the TS values

were accumulating in proportions very different from those of the Tunbridge Wells populations. On Stace's advice a histogram (Fig. 1) was prepared from results obtained from 93 colonies, all white-flowered, from the Dartford area which had been intensively covered, particularly by Mrs. Sally Foster. From this it may be seen that the range of TS values should be from 5-13 for *C. sepium*, 14-16 for the hybrid and 17 onwards for *C. silvatica*; Stace agreed that these ranges should be adopted for the final plotting of the distribution of the London colonies. This has been done on the Society's new grid-recording maps, which enable plotting on a 1 km grid basis to be easily undertaken.



each ● represents a 1 km grid square in which at least one result was obtained.

Recorders were asked to send specimens of completely pink-flowered plants in case these should prove to be *C. pulchra* Brummitt and Heywood, a species recently recognised as introduced into the British Isles but not included in our survey. Dr. R. C. Brummitt kindly checked the identifications and most pink-flowered specimens submitted were eliminated as this species.

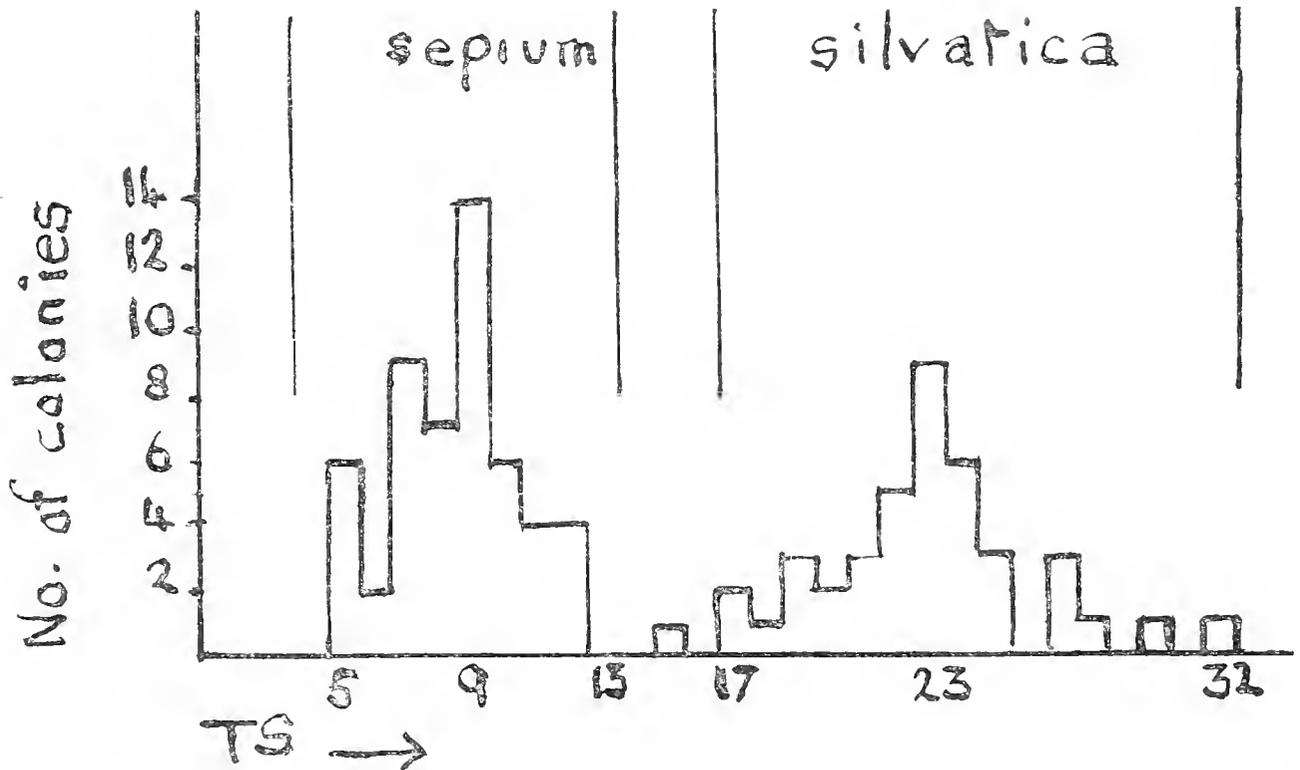


FIG. 1. Hybrid index of colonies in the Dartford area.

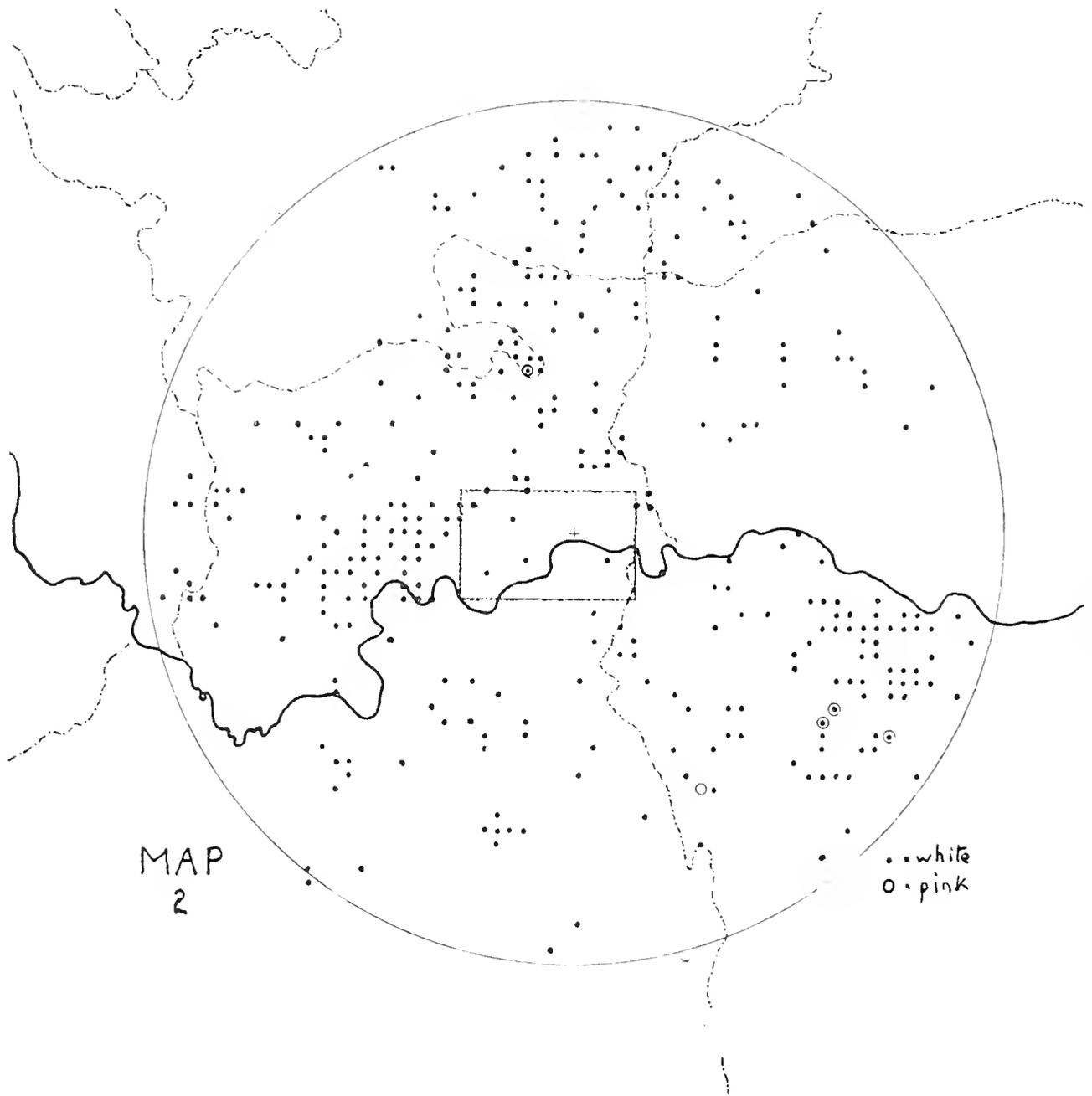
RESULTS

A total of 1,237 cards was amassed during the period of the survey. Of these, 892 were of white-flowered plants and 345 of pink-veined; only 5 of the latter fell into the category of *C. sepium*. Four hundred and seventy-one cards were referable to *C. sepium*, 730 to *C. silvatica* and the remaining 36 to the hybrid. The number of cards for each TS value from 5–32 is shown in Table 1, which also indicates how many pink-veined plants were recorded for each TS value. From this Table it is possible to construct histograms, which are not here provided in the interests of space, but which would present a pattern closely in agreement with that of Fig. 1, except that the “peaks” would rise much higher. The main aim of the survey, to show the distribution of the three taxa in the London Area according to Stace’s method, is fulfilled by the presentation of the maps illustrating this paper.

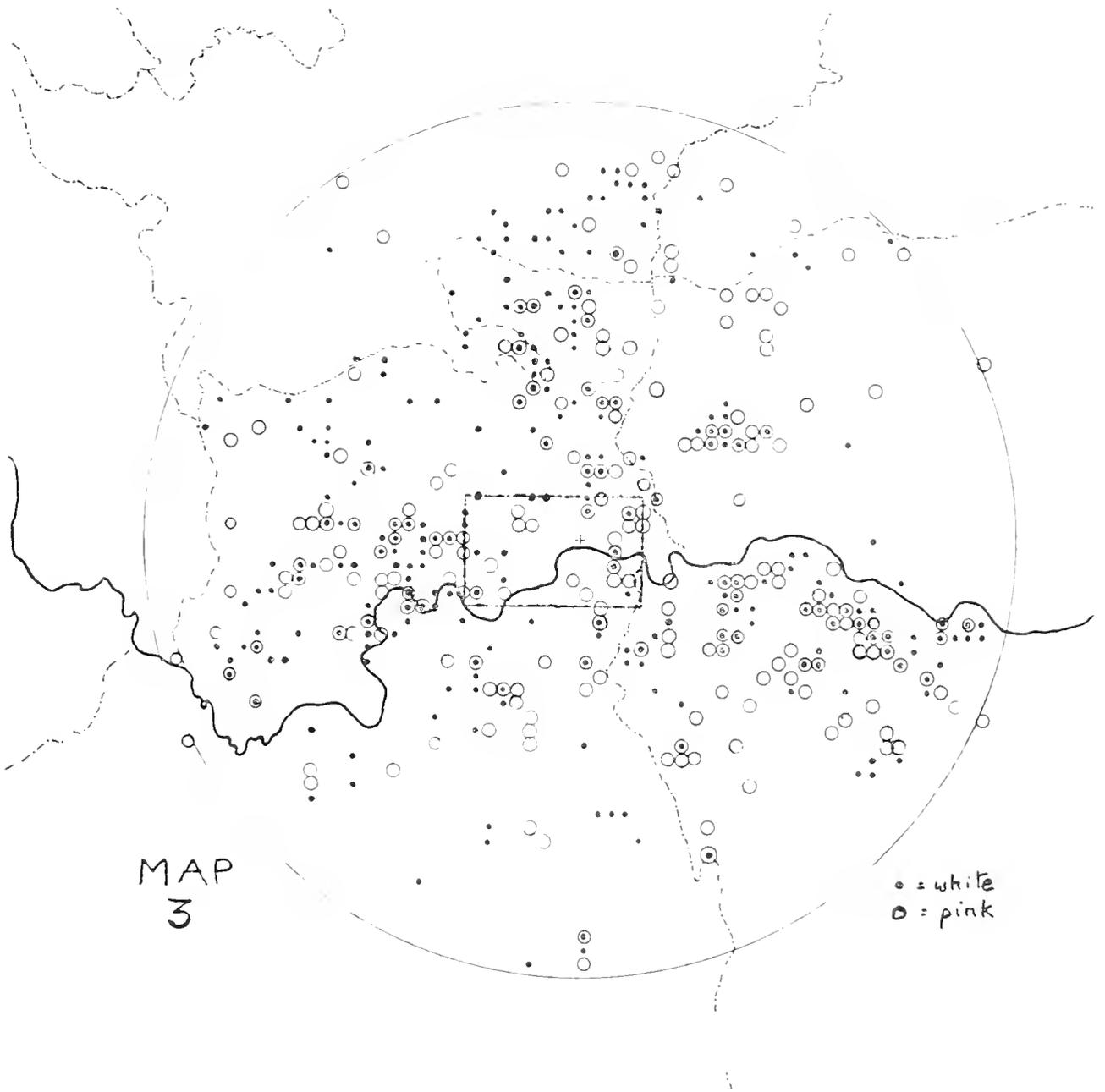
TABLE 1

TS Values	Number of cards:			TS Values	Number of cards:		
	White	Pink	Total		White	Pink	Total
5	12	0	12	19	44	30	74
6	43	0	43	20	41	44	85
7	96	0	96	21	49	36	85
8	98	3	101	22	50	44	94
9	83	0	83	23	66	43	109
10	62	0	62	24	51	26	77
11	36	0	36	25	27	27	54
12	26	1	27	26	16	20	36
13	11	1	12	27	8	12	20
14	7	0	7	28	2	10	12
15	9	1	10	29	1	6	7
16	10	9	19	30	1	6	7
17	18	10	28	31	0	2	2
18	24	13	37	32	1	1	2

Totals: 892 white-flowered; 345 pink-veined; 1,237 all



Distribution of *Calystegia sepium* as determined by L.N.H.S. Survey.



Distribution of *Calystegia silvatica* as determined by L.N.H.S. Survey.



Distribution of hybrid (*Calystegia X lucana*) as determined by L.N.H.S. Survey.

DISCUSSION

The maps and other data having been presented, their interpretation is left to the reader, who may draw such conclusions as are consistent with the evidence. Attention is drawn, however, to one or two significant facts.

Map 1 shows the distribution of all 1 km grid squares in which at least one colony was investigated but coverage of our area by the survey was more complete than thus indicated, as several workers in many of the outer squares reported an absence of colonies, accounting for some of the gaps on the map.

Examination of Maps 2 and 3 reveals a somewhat more frequent occurrence of *C. sepium* than of *C. silvatica* in the outer localities. In the Inner London area *C. silvatica* has a denser distribution.

C. pulchra was not noted frequently and only 14 cards were returned for plants that proved to be this species. Potential hybrids between *C. pulchra* and *C. silvatica* may have been, although rarely it is assumed, included in the survey as pink-veined *C. silvatica*. For this reason care

has been taken to present data in such form that pink-flowered colonies can be eliminated from calculations by removing the circles on the maps and the appropriate columns in Table 1.

The difference in the range of TS values for *C. sepium* as found by Stace for the Tunbridge Wells colonies and by the survey for London colonies is very slight; the major difference is in the range of *C. silvatica*. Two of the possible reasons for this as suggested by Stace are: (a) "different strains of *C. silvatica* involved"; (b) "introgression of *C. sepium* into *C. silvatica* lowering TS value of some apparently pure *C. silvatica*".

APPENDIX 1

The table below is an analysis of habitat preference, amended to include last season's results and to allow for the revised ranges of TS values; for fuller definitions of habitat types see the Fourth Progress Report.

Type A: roadside verges and hedges

B: cultivated ground, gardens

C: uncultivated and waste ground

D: open fields, grassland, commons

E: aquatic, e.g. pondsides, streamsides, marshy ground.

The table shows percentage occurrence in each habitat type:

	Type:	A	B	C	D	E
<i>C. sepium</i>		30%	41%	15%	8%	6%
hybrid		15%	40%	30%	11%	4%
<i>C. silvatica</i>		19%	36%	30%	10%	5%

APPENDIX 2

Last year an appeal was made for more detailed recording of species closely associated with *Calystegia* spp. in order that the list then published might be extended. The response has been good and the following species should be added to that list; as before an asterisk indicates a species mentioned between 6 and 12 times and (fr) indicates mentioned more than 12 times. Kent and Lousley (1951-57) has been referred to for common names and Dandy (1958) for scientific names.

- Equisetum arvense* (Common Horsetail)
- Taxus baccata* (Yew)
- Ranunculus repens* (Creeping Buttercup)
- Chelidonium majus* (Greater Celandine)
- Alliaria petiolata* (Garlic Mustard)
- Stellaria media* (Common Chickweed)
- Malva neglecta* (Small-flowered Mallow)
- Impatiens glandulifera* (Indian Balsam)
- Epilobium montanum* (Broad-leaved Willowherb)
- Thelycrania sanguinea* (Dogwood)
- Heracleum persicum* (a Giant Hogweed)
- Mercurialis annua* (Annual Mercury)
- Euphorbia peplus* (Petty Spurge)
- Polygonum convolvulus* (Black Bindweed)
- Rumex obtusifolius** (Broad-leaved Dock)
- Urtica urens* (Small Nettle)
- Ulmus procera* (English Elm)
- Corylus avellana* (Hazel)
- Fagus sylvatica* (Beech)
- Quercus robur* (Common Oak)
- Buddleja davidii* (Buddleia)
- Fraxinus excelsior* (Ash)
- Symphytum uplandicum* (Russian Comfrey)
- Stachys sylvatica* (Hedge Woundwort)
- Ballota nigra* (Black Horehound)
- Lamium album* (fr) (White Dead-nettle)
- Glechoma hederacea* (Ground Ivy)
- Plantago major* (Great Plantain)

P. media (Hoary Plantain)
Galium aparine (Goosegrass)
Symphoricarpos rivularis (Snowberry)
Aster spp. (Michaelmas Daisies)
Eupatorium cannabinum (Hemp Agrimony)
Matricaria matricarioides (Pineapple-weed)
Cirsium palustre (Marsh Thistle)
Centaurea nigra (Lesser Knapweed)
Lapsana communis (Nipplewort)
Tragopogon pratensis (Goat's-beard)
Sonchus asper (Spiny Sowthistle)
Taraxacum officinale (Dandelion)
Tamus communis (Black Bryony)
*Lolium perenne** (Perennial Rye-grass)
Poa annua (Annual Meadow-grass)
*P. trivialis** (Rough Meadow-grass)
Dactylis glomerata (fr) (Cock's-foot)
Bromus carinatus (Californian Brome)
Agropyron repens (Couch-grass)
Hordeum murinum (Wall Barley)
Arrhenatherum elatius (fr) (False Oat-grass)
Agrostis stolonifera (Creeping Bent)

Species in last year's list which now have revised frequency symbols are:

*Clematis vitalba**, *Chamaenerion angustifolium**, *Polygonum cuspidatum**, *Achillea millefolium**,
Acer pseudo-platanus (fr), *Epilobium hirsutum* (fr), *Hedera helix* (fr), *Heracleum sphondylium* (fr)
Convolvulus arvensis (fr), *Solanum dulcamara* (fr), *Sambucus nigra* (fr), *Senecio squalidus* (fr),
Cirsium arvense (fr).

Among garden trees and shrubs, Apple, Plum, Cherry, Laburnum, Lilac, Raspberry, Currants and Barberry were mentioned. *Arrhenatherum elatius*, the False Oat, was by far the most commonly associated grass.

ACKNOWLEDGMENTS

In addition to those helpers thanked in previous reports for particular services, the following must be mentioned: Mr. H. A. Sandford for advice on symbols used in mapping; Miss Jill Highley for making final copies of the maps; Mr. D. H. Kent for initiating the survey and most particularly to Dr. C. A. Stace, now at Manchester University, for suggesting that the Society should undertake the survey and for constant advice throughout its progress. Finally, gratitude must be expressed to all participants without whose efforts this final Report could not have appeared; these are, in alphabetical order:

Miss R. Alston, E. B. Bangerter, Mrs. B. F. Barrett, Miss B. E. Bayliss,
 Miss L. F. Bowden, Miss H. M. Britton, J. Burton, R. M. Burton, Dr.
 Anne Campbell, Mrs. M. J. Cannon, C. P. Castell, T. G. Collett, G.
 Eastwood, R. J. Edwards, Miss F. O. Elword, Miss P. A. Firell, Mrs. M.
 C. Foster, Miss R. Fox, Miss M. B. Gerrans, Miss J. A. Goodlet, Miss S.
 Gould, E. W. Groves, P. Halligey, Miss D. Harbott, Miss J. Highley,
 P. C. Holland, E. Hopkin, J. E. Howat, Ilford Girls Co. High School,
 Dr. D. Irvine, Mrs. L. Irvine, A. C. Jermy, Miss M. E. Kennedy, D. H.
 Kent, A. D. King, H. Larter, Mrs. K. le Sueur, Lewisham Nat. Hist. Soc.,
 J. W. Lucas, J. B. Marshall, Miss S. Martyn, Mrs. J. McLean, Miss A. S.
 Morris, Miss E. G. Moyes, Miss V. F. Mulford, Miss E. M. Nelmes,
 Mrs. J. Parker, Miss T. E. Parker, J. H. G. Peterken, Mrs. S. P. Phillips,
 J. H. Price, Dr. C. T. Prime, Miss M. E. Robins, Miss R. F. Rönaasen,
 Miss J. A. Roxburgh, A. J. Silverdale, Miss P. A. Sims, Mrs. L. M. P.
 Small, Mrs. J. Smith, Dr. C. A. Stace, P. C. Tinning, I. A. Tittley, K.
 White, Mrs. D. A. Wilson, Miss D. E. Woods, B. Wurzell.

REFERENCES

- BANGERTER, E. B., 1964, A survey of Calystegia in the London Area: Second Progress Report, *Lond. Nat.*, **43**, 23-24.
———, 1965, A survey of Calystegia in the London Area: Third Progress Report, *Lond. Nat.*, **44**, 29.
———, 1966, A survey of Calystegia in the London Area: Fourth Progress Report, *Lond. Nat.*, **45**, 22-24.
DANDY, J. E., 1958, *List of British Vascular Plants*.
HOLLAND, P. C., 1963, A survey of Calystegia in the London Area: Progress Report 1962, *Lond. Nat.*, **42**, 18.
KENT, D. H., 1962, A survey of Calystegia in the London Area, *Lond. Nat.*, **41**, 15.
KENT, D. H., and LOUSLEY, J. E., 1951-57, *A Hand List of the Plants of the London Area*, supplement to *Lond. Nat.*, **30-36**.
STACE, C. A., 1961, Some studies in Calystegia: compatibility and hybridisation in *C. sepium* and *C. silvatica*, *Watsonia*, **5**, 88-105.

Botany Section Plant Mapping Scheme

Progress Report for 1966

LAST year we reported that cards had been submitted for about 250 tetrads. Our hope that a similarly respectable proportion of the 850 squares in our area would be worked in the second year of the scheme has not materialised. This year's contributions have increased our master cards by 80 only and, although valuable work has continued in many of the squares first visited in 1965, our Vice-county Recorders have been disappointed to receive so few cards from members. The bulk of the records so far made is due to the efforts of a rather small band of keen members and the Vice-county Recorders themselves. *Your* help is urgently needed.

The counties most in need of workers are Essex (V.-c.'s 18 and 19), Herts. (V.-c. 20) and Bucks. (V.-c. 24), where relatively few squares have been visited so far. About one quarter of the squares in Surrey (V.-c. 17) have been worked (very few at all thoroughly), the remainder being scattered throughout the county. Nearly half the squares in Kent (V.-c. 16) have been tackled. Those so far untouched are mainly in the western half of the area, which includes the inner, built-up parts as well as more rural spots to the south. Middlesex (V.-c. 21) is the most thoroughly worked county, practically all squares having been visited, though useful work can still be done here, particularly in the eastern sector.

Since we still have so much ground to cover, no plotting of plant distributions has been attempted so far and my remarks have been concerned with the mere number of cards submitted. This may give the impression that quantity is everything. It is not. One card from a thoroughly explored tetrad is of greater value than a dozen from casually, incompletely recorded squares. However, be your contribution great or small, you are urged to support this scheme, so that next year's Progress Report may justify its title.

P.C.H.

Pyrola Rotundifolia in the London Area of Kent

By MRS. A. G. SIDE, F.L.S.

THE chalk pits south of the Thames from Dartford to Gravesend are scars formed for the most part in the last hundred years. The road to Gravesend from Stone runs literally on a wall-top for much of its length with deep pits on either side. As the pits become disused, wild vegetation grows over them, and some interesting floras are the result. One pit, for example, has in it a flourishing colony of *Epipactis palustris*, since the floor of the pit has reached the level of the water-table.

It is the present policy of some Rural District Councils to have the pits filled with refuse from Greater London and dozens of refuse lorries can be seen daily depositing their loads, often leaving a trail of dirty paper for a mile or so from the pits. One pit in particular, which has been visited by botanists for many years because of its rich growth of alien plants, has had its treasures buried during the last two years.

The pit at Horns Cross which has aroused special interest lately is a large one and no chalk has been excavated from it for some time. There are many inhabitants of Stone who still remember the fields of strawberries which stood, before the pit was started, some hundred feet above the present ground level. The excavations began at the turn of the century at the western end of the pit and were made with pick and shovel worked manually. This older part now houses the works of a pre-cast-concrete manufacturing company and stands in little danger of being filled in with refuse at present. It is, however, filled in with offices and other buildings connected with the works and is of little interest botanically.

The main pit, which was begun soon after the end of the first World War, developed more rapidly with mechanical excavators. When I first saw it in 1952, from the top of an omnibus, it had reached its present dimensions and was thickly overgrown with birches and willows. A football pitch had been laid out at the northern end, and this pitch is still used by the team of the "Works" which owns the pit. Traces of the old railways which carried the chalk from the quarry face to the nearby cement factory on the marshes can still be seen among the trees and their cinder-ways are micro-habitats for a number of plants. On the whole, however, once one is among the trees it is difficult to land-mark any particular plant position. I have had difficulty sometimes in refinding the exact position of the colony of *Epipactis phyllanthes* when revisiting the pit. The larger area grown over with *Pyrola rotundifolia* is now quite familiar to me, but I still have trouble in finding the second patch of it in the "jungle".

A correspondent of *The Times* about ten years ago described in glowing terms the sight of *Centranthus ruber*, red against the white cliffs, when he visited Stone church. It is a sight worth seeing growing with *Diplotaxis tenuifolia*. The sight which has drawn me to the pit for the last four years is that of dozens of flowering stems of *Pyrola rotundifolia* standing up above the ivy which abounds in that area. The Wintergreen was found in a similar position in Essex many years ago, so it was particularly pleasing to find it in Kent. It has obviously been growing in this locality for many years as it has spread over a good deal of ground.

When Dr. Francis Rose was taken to see the plant he hunted around

the pit and found *Epipactis phyllanthes* to add to the pleasure. Mr. Lousley in his turn added *Calamagrostis epigejos*, and the following year Mr. Side and I, listing plants on the scree at the base of the steep cliffs, found *Nardurus maritimus* growing freely. *Dactylorhiza fuchsii* is particularly abundant and so is *Listera ovata*. *Ophrys apifera* is also present. The following list is probably very incomplete but it is the only one available for this pit at present:—

<i>Taxus baccata</i>	<i>Chamaenerion angustifolium</i>	<i>Eupatorium cannabinum</i>
<i>Clematis vitalba</i>	<i>Thelycrania sanguinea</i>	<i>Achillea millefolium</i>
<i>Diplotaxis tenuifolia</i>	<i>Hedera helix</i>	<i>Chrysanthemum leucanthemum</i>
<i>Reseda lutea</i>	<i>Pastinaca sativa</i>	<i>Artemisia vulgaris</i>
<i>Hypericum perforatum</i>	<i>Daucus carota</i>	<i>Carlina vulgaris</i>
<i>Silene alba</i>	<i>Bryonia dioica</i>	<i>Arctium nemorosum</i>
<i>S. vulgaris</i>	<i>Betula pendula</i>	<i>Carduus acanthoides</i>
<i>Cerastium holosteoides</i>	<i>Quercus robur</i>	<i>Cirsium arvense</i>
<i>Arenaria leptoclados</i>	<i>Q. ilex</i>	<i>Centaurea scabiosa</i>
<i>Geranium dissectum</i>	<i>Populus tremula</i>	<i>Hypochoeris radicata</i>
<i>G. molle</i>	<i>P. nigra</i>	<i>Sonchus arvensis</i>
<i>Acer pseudoplatanus</i>	<i>Salix caprea</i>	<i>Hieracium murorum sensu lato</i>
<i>Medicago lupulina</i>	<i>Pyrola rotundifolia</i>	<i>H. pilosella sensu lato</i>
<i>Melilotus officinalis</i>	<i>Buddleja davidii</i>	<i>Crepis vesicaria</i>
<i>M. alba</i>	<i>Blackstonia perfoliata</i>	<i>Taraxacum officinale</i>
<i>Trifolium pratense</i>	<i>Verbascum thapsus</i>	<i>Epipactis phyllanthes</i>
<i>T. repens</i>	<i>Veronica arvensis</i>	<i>Listera ovata</i>
<i>T. campestre</i>	<i>Origanum vulgare</i>	<i>Ophrys apifera</i>
<i>T. dubium</i>	<i>Ballota nigra</i>	<i>Dactylorhiza fuchsii</i>
<i>Lotus corniculatus</i>	<i>Lamium purpureum</i>	<i>Festuca rubra</i>
<i>Vicia hirsuta</i>	<i>L. album</i>	<i>Lolium perenne</i>
<i>V. sativa</i>	<i>Glechoma hederacea</i>	<i>Nardurus maritimus</i>
<i>Rubus fruticosus agg.</i>	<i>Plantago major</i>	<i>Poa annua</i>
<i>Potentilla reptans</i>	<i>P. lanceolata</i>	<i>P. pratensis</i>
<i>Fragaria vesca</i>	<i>Sambucus nigra</i>	<i>P. trivialis</i>
<i>F. ananassa</i>	<i>Viburnum lantana</i>	<i>Dactylis glomerata</i>
<i>Geum urbanum</i>	<i>Centranthus ruber</i>	<i>Bromus mollis</i>
<i>Agrimonia eupatoria</i>	<i>Dipsacus fullonum</i>	<i>Arrhenatherum elatius</i>
<i>Rosa canina</i>	<i>Senecio squalidus</i>	<i>Holcus lanatus</i>
<i>Crataegus monogyna</i>	<i>Tussilago farfara</i>	<i>Calamagrostis epigejos</i>
<i>Sorbus intermedia</i>	<i>Inula conyza</i>	<i>Agrostis stolonifera</i>
<i>Sedum acre</i>	<i>Bellis perennis</i>	

It is obvious that this pit is a site of special interest to botanists and would, I am sure, repay careful study. Permission to enter it must be obtained, and it is not desirable that large parties should visit it. It carries a railway leading from other newer pits to the cement works and train loads of chalk are constantly passing through. While this lasts there is little danger of the pit being filled with refuse. A future threat might be the using of the land as a building site. This has occurred at Northfleet and Grays where whole communities, complete with factories, have grown up in old chalk pits. It is to be hoped that the pit at Horns Cross will be preserved as a site of scientific interest for a more enlightened age.

Additions and Corrections to the Flora of Central London (3)

Compiled by DOUGLAS H. KENT

“A CONTRIBUTION to the flora of Central London” was printed in 1960, with an addenda in 1961, and supplementary papers containing additions and corrections appeared in 1962 and 1965. The present paper incorporates further records of taxa new to the area as well as additional localities for interesting species previously noted up the end of 1966.

In 1962 I referred to the influx of alien species which had originated as seed in bird-seed mixtures, which were being freely scattered as food for wild birds in the London Parks and open spaces. Additional species which have been added to the list from this source are *Rapistrum rugosum* subsp. *linnaeanum*, *Camelina sativa*, *Vaccaria pyramidata*, *Coriandrum sativum*, *Anethum graveolens*, *Fagopyrum esculentum*, *Tagetes minuta*, *Eragrostis parviflora* and *Setaria lutescens*.

The arrangement of the list that follows is that of Kent (1960, 1962 and 1965) and the nomenclature is based, with modifications, on that of Dandy (1958). English names are provided only for species additional to Kent (1960, 1962 and 1965). The following signs are used:—

* Plant merely casual.

† Plant of foreign or cultivated origin.

! Following a locality indicates that the plant has been seen there by the compiler; ! following a recorder's initials indicates that the record was made in the company of the compiler.

§ Plant additional to those listed by Kent (1960, 1962 and 1965).

Records not followed by a recorder's initials were made by the compiler.

I am indebted to friends and correspondents who have again provided records, and especially to D. E. Allen, Lady Anne Brewis, E. J. Clement, J. E. Lousley and D. McClintock.

INDEX TO NAMES OF RECORDERS AND SPECIALISTS

A.Br.	Brewis, Lady Anne	H.C.H.	Holme, H. C.
B.Wu.	Wurzell, B.	J.E.L.	Lousley, J. E.
C.E.H.	Hubbard, Dr. C. E.	J.J.P.	Potter, J. J.
C.W.	West, Dr. C.	M.E.K.	Kennedy, Miss M. E.
D.E.A.	Allen, D. E.	P.D.S.	Sell, P. D.
D.McC.	McClintock, D.	R.C.	Clarke, R.
D.P.Y.	Young, Dr. D.P.	R.M.B.	Burton, R. M.
D.T.	Turner, D.	R.R.	Rönaasen, Miss R.
E.J.C.	Clement, E. J.	R.S.R.F.	Fitter, R. S. R.

PTERIDOPHYTA

SPHENOPSISIDA

EQUISETACEAE

EQUISETUM ARVENSE L. Near the Dorchester Hotel, W.1, 1965,
D.E.A. Site of Luxborough Lodge, Marylebone Road, N.W.1,
1966, A.Br.

PTEROPSIDA

ASPLENIACEAE

PHYLLITIS SCOLOPENDRIUM (L.) Newm. Area wall, Red Lion Square, W.C.2, one plant, c. 4 inches long, 1965, R.M.B.

ATHYRIACEAE

§ATHYRIUM FILIX-FEMINA (L.) Roth. *Lady-fern*. A number of fine specimens in a well-basement, Red Lion Square, W.C.2, with *Dryopteris dilatata* and *Pteridium aquilinum*, 1965!; eradicated, 1966, D.T.

ASPIDIACEAE

DRYOPTERIS DILATATA (Hoffm.) A. Gray. Well-basement, Red Lion Square, W.C.2, with *Athyrium filix-femina* and *Pteridium aquilinum*, 1965!; eradicated, 1966, D.T. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.

ANGIOSPERMAE

DICOTYLEDONES

RANUNCULACEAE

CLEMATIS VITALBA L. Waste ground, Hoxton, 1966. Cheltenham Terrace, S.W.3, 1966; grass strip between Hyde Park and Kensington Gore, immediately next to Knightsbridge Barracks, 1966, A.Br.

PAPAVERACEAE

*PAPAVER RHOEAS L. Frequent in a flower-bed at Sara Siddons Youth Centre, Harrow Road, W.2, with *Anagallis arvensis*, *Veronica persica*, *V. polita*, *Anthemis cotula* and *Centaurea cyanus*, 1965-66. Plentiful on disturbed builder's ground in front of Lord's View, St. Johns Wood Road, N.W.8, with *Raphanus raphanistrum* *Solanum nigrum* and *Veronica persica*, 1966. Near Dorchester Hotel, W.1, 1965, D.E.A. Weed in churchyard of All-Hallows Berkyng, E.C.3, with *P. dubium*, 1966. Car park west of Festival Hall, S.E.1, 1966, D.McC. and J.E.L.

*P. DUBIUM L. Weed in churchyard of All Hallows Berkyng, E.C.3, with *P. rhoeas*, 1966.

CHELIDONIUM MAJUS L. Weed in shrubbery, Hyde Park Corner, 1965, A.Br.

FUMARIACEAE

FUMARIA OFFICINALIS L. Still at Eaton Square, S.W.1, 1966, A.Br.

CRUCIFERAE

*†BRASSICA JUNCEA (L.) Czern & Coss. Regents Park, 1966, H.C.H., det. D.H.K.

†B. INTEGRIFOLIA var. CARINATA (A. Braun) O. E. Schulz. Still persisting in small quantity as a weed of flower-beds in Trinity Square, E.C.3, where it was first recorded in 1950 (cf. *Lond. Nat.*, 39, 44).

*SINAPIS ALBA L. Near Festival Hall, S.E.1, 1966, D.McC. and J.E.L.

§†HIRSCHFELDIA INCANA (L.) Lagr.-Foss. *Hoary Mustard*. Mediterranean region. Very rare. Car park, East Smithfield, E.1, 1966, A.Br.

- DIPLLOTAXIS TENUIFOLIA (L.) DC. Waste ground near Euston Station, N.W.1, 1965. Near Hyde Park, 1965!, D.E.A., D.McC. and R.R. Knightsbridge, S.W.1, one plant, 1966. Waste ground, Hoxton, locally plentiful, 1966.
- *RAPHANUS RAPHANISTRUM L. Abundant on disturbed builder's ground in front of Lord's View, St. Johns Wood Road, N.W.8, 1966.
- §*†R. SATIVUS L. *Cultivated Radish*. China. Outcast from cultivation. Near Festival Hall, S.E.1, 1966, D.McC. and J.E.L.
- §*†RAPISTRUM RUGOSUM subsp. LINNAEANUM Rouy & Fouc. Mediterranean region. Near Bedford College, Regents Park, 1966, A.Br., det. D.McC. (as *R. hispanicum*).
- *THLASPI ARVENSE L. Near Dorchester Hotel, W.1, 1964, D.E.A. and J.J.P. Knightsbridge, one plant, 1966. Disturbed ground where tree had been removed near Marylebone Parish Church, 1966, D.E.A.
- §COCHLEARIA ANGLICA L. *English Scurvy-grass*. Very rare. Embankment wall of Thames, Battersea Park, 1965, R.C. (Lousley, 1966). One of the few maritime species which extends along the Thames into Inner London.
- §†BUNIAS ORIENTALIS L. Europe. Canal bank, Camden Town, a large colony, 1966.
- CARDAMINE HIRSUTA L. Weed of flower-beds, Zoological Gardens, Regents Park, 1966, A.Br.
- RORIPPA SYLVESTRIS (L.) Bess. Tower of London gardens, 1966. Locally plentiful near Festival Hall, S.E.1, 1966, C.McC. and J.E.L.
- R. ISLANDICA (Oeder) Borbás. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.
- ERYSIMUM CHEIRANTHOIDES L. Weed of flower-beds near Tower Hill, E.C.3, 1966. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.
- †SISYMBRIUM IRIO L. Near the Snake Pit, Zoological Gardens, Regents Park, 1966, M.E.K., conf. D.H.K.
- †s. LOESELII L. Slum clearance area near Paddington Basin, W.2, 1966.
- †s. ORIENTALE L. Waste ground near Euston Station, 1965. Island at bottom of Park Lane, W.1, 1965, A.Br. Roadside, Stanhope Terrace, W.2, 1966. Tower Hill, 1965, A.Br. Euston Road, N.W.1, 1966, H.C.H., det. D.H.K. Car park east of Festival Hall, S.E.1, and adjacent waste ground, etc., abundant, 1966, D.McC. and J.E.L. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.
- †s. ALTISSIMUM L. Slum clearance areas between Royal Oak and Paddington, abundant, 1966. Disturbed ground at site of Harrow Road-Edgware Road Flyover, W.2, a single large plant, 1966. Waste ground, Hoxton, 1966. Car park west of Festival Hall, S.E.1, 1966, D.McC. and J.E.L.
- §*†CAMELINA SATIVA L. *Gold of Pleasure*. Europe. Regents Park, 1966, H.C.H., det. D.H.K.

RESEDACEAE

- RESEDA LUTEOLA L. Building site, Hampstead Road, N.W.1, 1966.
- R. LUTEA L. Camden Town, 1966. St. Pancras Goods Yard, 1966. Building site, Hampstead Road, N.W.1, 1966. Waste ground, Porteus Road, W.2, 1966. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.

CARYOPHYLLACEAE

- §*†VACCARIA PYRAMIDATA Medic. Mediterranean region. Regents Park, 1966, H.C.H., conf. D.H.K. Near Festival Hall, S.E.1, 1966, J.E.L. (Lousley, 1967).
 STELLARIA GRAMINEA L. Building site at south end of Waterloo Bridge, 1966, R.M.B. (Lousley, 1967).
 SAGINA APETALA Ard. Bottom of a memorial between Admiralty Arch and The Citadel, S.W.1, 1965, A.Br. (as *S. ciliata*).
 s. CILIATA Fr. The record given in *Lond. Nat.*, 44, 21 (1965) is referable to *S. apetala*.
 ARENARIA SERPYLLIFOLIA L. Weed of flower-beds, Zoological Gardens, Regents Park, 1966, A.Br.
 *SPERGULA ARVENSIS L. Oval Cricket Ground, a single plant, 1965. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.

PORTULACACEAE

- †MONTIA PERFOLIATA (Willd.) Howell. Weed of shrubbery, Regents Park, 1965, B.Wu. Queen's Gate Gardens, S.W.7, 1966, A.Br.

CHENOPODIACEAE

- §*CHENOPODIUM VULVARIA L. *Stinking Goosefoot*. A single plant in a flower-tub, Mansell Street, S.W.1, 1965, D.McC. (Lousley, 1966).
 C. RUBRUM L. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, H.C.H., det. D.H.K.

MALVACEAE

- MALVA NEGLECTA Wallr. Tower Hill, 1966. Near Festival Hall, S.E.1, 1966, D.McC. & J.E.L. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.

GERANIACEAE

- §†GERANIUM PLATYPETALUM Fisch. & Mey. (*G. ibericum* auct., non L.). Caucasus. Garden escape. Regent's Park, 1960.
 §G. ROBERTIANUM L. *Herb Robert*. Very rare. Nine Elms Goods Yard, 1966, A.Br., D.P.Y., E.J.C. and R.C.

OXALIDACEAE

- †OXALIS CORNICULATA L. Garden pest, Hoxton, 1966. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.

BALSAMINACEAE

- §†IMPATIENS CAPENSIS Meerb. *Orange Balsam, Jewel Flower*. N. America. Very rare. Canal side, Regents Park, 1966, A.Br.
 †I. PARVIFLORA DC. North-east corner of Primrose Hill, N.W.3, 1966, R.S.R.F. Christ's Church, Greyfriars, E.C, 1966, A.Br.

LEGUMINOSAE

- *MEDICAGO ARABICA (L.) Huds. Near Dorchester Hotel, W.1, 1965, D.E.A.
 †MELILOTUS ALBA Medic. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.
 †TRIFOLIUM HYBRIDUM L. Garden weed, Circus Road, N.W.8, 1965.
 *T. MICRANTHUM Viv. Near Dorchester Hotel, W.1, 1965, D.E.A.

- LOTUS CORNICULATUS L. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.
- §† COLUTEA ARBORESCENS L. *Bladder Senna*. S. Europe. Very rare. Battersea Park, 1965, R.C. Canal side, Islington, 1966.
- VICIA TETRASPERMA (L.) Schreb. Near Hyde Park, 1965, D.E.A., D.McC. and R.R. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.
- V. CRACCA L. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.
- §† V. SATIVA L. *Common Vetch*. Europe. Very rare. Finsbury Square, E.C.2, 1966. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.
- V. ANGUSTIFOLIA L. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.
- § LATHYRUS NISSOLIA L. *Crimson Grass Vetchling, Grass Pea*. Very rare. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br. This record is of particular interest as the species was recorded from Marylebone by Dale in Merrett's *Pinax rerum naturalium Britannicum*, published in 1666.
- † L. LATIFOLIUS L. St. Johns Wood Churchyard, 1966!, H.C.H. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.

ROSACEAE

- POTENTILLA ERECTA × REPTANS = P. × ITALICA Lehm. Wolf's enclosure, Zoological Gardens, Regents Park, 1966!, H.C.H.
- AGRIMONIA EUPATORIA L. Weed of flower-bed, Lincoln's Inn Fields, W.C.2, 1965, R.M.B.
- APHANES MICROCARPA (Boiss. & Reut.) Rothm. Weed of flower-beds, Zoological Gardens, Regents Park, 1966, A.Br.
- §*† PRUNUS PERSICA L. Peach. Asia. Car park, Kensington High Street, a seedling, 1966, A.Br.
- §† COTONEASTER HORIZONTALIS Decne. Himalaya. Bird-sown from gardens. Very rare. Wall adjoining Horse Guard's Parade, S.W.1, 1965, A.Br.
- † SORBUS INTERMEDIA (Ehrh.) Pers. St. Botolph's without Aldgate, E.C., a seedling, 1966, A.Br.

CRASSULACEAE

- SEDUM ACRE L. Top of brick wall enclosing a bombed site used as a car park, south side of Ludgate Hill, E.C., 1965, R.M.B.

ONAGRACEAE

- EPILOBIUM ROSEUM Schreb. St. Paul's Churchyard, Covent Garden, 1965, R.M.B. St. Luke's Churchyard, S.W.3, 1966; site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.
- §† E. ADENOCAULON × HIRSUTUM. Near Regents Park Underground Station, 1966!, D.E.A., conf. D.H.K.
- † OENOTHERA BIENNIS L. Tower Hill, 1965, A.Br.
- † O. ERYTHROSEPALA Borbás. Waste ground, Porteus Road, W.2, a large colony, 1965. Tower Hill, 1965, A.Br. Waste ground, Camden Town, 1966. St. Pancras Goods Yard, 1966.
- † O. PARVIFLORA L. South Lambeth, 1965, A.Br.

UMBELLIFERAE

- §*†CORIANDRUM SATIVUM L. *Coriander*. Europe. Abundant in a derelict garden near Paddington, 1965. Tower of London gardens, about twenty small colonies, 1966.
- §†APIUM GRAVEOLENS subsp. DULCE (Mill.) Lemke & Rothm. (*A. dulce* Mill.). *Garden Celery*. Outcast from cultivation. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.
- §A. NODIFLORUM (L.) Lag. *Marsh Wort, Fool's Watercress*. Very rare. Established in a lawn at the back of the National Gallery (Herrick Street), S.W.1, 1965, D.McC. A most unusual habitat for this aquatic species.
- §PIMPINELLA SAXIFRAGA L. *Burnet Saxifrage*. Very rare. In turf, Finsbury Square, E.C.2, 1966.
- ANGELICA SYLVESTRIS L. Weed in flower border, Wellington Road, N.W.8, 1965.
- †A. ARCHANGELICA L. River wall just north of Vauxhall Bridge, 1966, A.Br. (Lousley, 1967).
- CONIUM MACULATUM L. Canal side near Paddington Basin, W.2, frequent, 1966. Canal side, Camden Town, 1966.
- §*†ANETHUM GRAVEOLENS L. *Dill*. Africa. Zoological Gardens, Regents Park, 1966, H.C.H., det. D.H.K.
- DAUCUS CAROTA L. Stag Place, S.W.1, 1966, D.McC. (Lousley, 1967).

POLYGONACEAE

- POLYGONUM AMPHIBIUM L. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C., det. D.P.Y.
- P. LAPATHIFOLIUM L. Garden weed, Circus Road and Cavendish Avenue, N.W.8, 1965. Paddington Green, 1965.
- §*†FAGOPYRUM ESCULENTUM Moench. *Buckwheat*. Asia. Kensington Gardens, near Lancaster Gate, 1965, B.Wu.
- RUMEX ACETOSA L. Finsbury Square, E.C.2, 1966. Car park, Kensington High Street, 1966, A.Br.
- §R. HYDROLAPATHUM Huds. *Great Water Dock*. Very rare. Canal wall near Paddington Basin, W.2, a fine clump, 1966.

URTICACEAE

- †PARIETARIA JUDAICA L. (*P. diffusa* Mert. & Koch). River wall near Festival Hall, S.E.1. 1966, D.McC. and J.E.L.
- §†SOLEIROLIA SOLEIROLII (Req.) Dandy (*Helxine soleirolii* Req.). *Mind-your-own-business*. Europe. Garden escape. Very rare. Established at base of a wall in an old burial ground, Marylebone Road, N.W.1, 1966, A.Br.

CANNABIACEAE

- HUMULUS LUPULUS L. Wellington Road, N.W.8, 1965-66.
- *†CANNABIS SATIVA L. Regents Park, 1966, H.C.H., det. D.H.K.

ULMACEAE

- §ULMUS GLABRA Huds., *sensu lato*. *Wych Elm*. Canal side, Islington, 1966.

MORACEAE

- †FICUS CARICA L. South Lambeth, 1965, A.Br.

BETULACEAE

ALNUS GLUTINOSA (L.) Gaertn. River wall near near Festival Hall, S.E.1, 1966, D.McC. and J.E.L.

FAGACEAE

†QUERCUS CERRIS L. Regenerating freely in Hyde Park and Kensington Gardens, Bayswater Road, W.2, etc., 1966.

SALICACEAE

§POPULUS TREMULA L. *Aspen*. Very rare. Waste ground alongside Puddle Dock, E.C.4, a sapling, c. 3 feet tall, 1965, R.M.B. Nine Elms Goods Yard, one bush, 1966, A.Br., D.P.Y., E.J.C. and R.C.

PRIMULACEAE

ANAGALLIS ARVENSIS L. Paddington Green, 1965. Lord's Cricket Ground, 1965. St. Johns Wood Road, N.W.8, 1966.

BORAGINACEAE

§SYMPHYTUM OFFICINALE L. *Comfrey*. Very rare. By the lake, St. James's Park, S.W.1, 1965, A.Br.

§†s. ASPERUM Lepech. × OFFICINALE = s. × UPLANDICUM Nyman. *Blue Comfrey, Russian Comfrey*. Cultivated as a foddercrop. Garden weed, Grosvenor Road, S.W.1, 1965. Regents Park, 1966, H.C.H., conf. D.H.K.

CONVOLVULACEAE

§CALYSTEGIA SEPIUM × SILVATICA = C. × LUCANA (Ten.) G. Don. Lisson Grove, N.W.1, 1965-66.

†C. SILVATICA (Kit.) Griseb. Near Pancras Way, N.W.1, 1965. Near Festival Hall, S.E.1, 1966, D.McC. and J.E.L. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.

†C. PULCHRA Brummitt & Heywood. Railway side near Paddington Station, 1966.

SOLANACEAE

ATROPA BELLADONNA L. Regents Park, in three places, 1965-66, J.J.P.

†HYOSCYAMUS NIGER L. Regents Park, 1966, J.J.P. Near Festival Hall, S.E.1, one very fine plant, 1966, D.McC. and J.E.L.

†DATURA STRAMONIUM L. Tower Hill, 1965, A.Br.

SCROPHULARIACEAE

*†ANTIRRHINUM MAJUS L. Waste ground near Euston Station, 1965.

§†LINARIA REPENS (L.) Mill. *Creeping Toadflax*. Nine Elms Goods Yard, S.W.8, two or three plants, 1966, A.Br., D.P.Y., E.J.C. and R.C.

L. VULGARIS Mill. Finsbury Square, E.C.2.

§*†L. MAROCCANA L.f. N. Africa. Garden escape. Regents Park, 1966, H.C.H., det. D.H.K.

*KICKXIA SPURIA (L.) Dumort. Oval Cricket Ground, a solitary fine plant, imported with "foreign" soil, 1965.

†CYMBALARIA MURALIS Gaertn., Mey. & Scherb. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.

SCROPHULARIA NODOSA L. Canal side near Paddington Basin, W.2, a small colony, 1966.

VERONICA CHAMAEDRYS L. Regents Park, 1966; St. Johns Wood Churchyard, 1966, H.C.H.

V. ARVENSIS L. Weed of flower-beds, Zoological Gardens, Regents Park, 1966, A.Br.

†V. PERSICA Poir. Paddington Green, 1965-66. Ranelagh Gardens, S.W.3, frequent, 1965. Car park west of Festival Hall, S.E.1, 1966, D.McC. and J.E.L.

V. POLITA Fr. Paddington Green, 1965.

LABIATAE

§†MENTHA SPICATA × SUAVEOLENS Ehrh. (*M. rotundifolia* auct., non L.), (*M. × niliaca* auct.). Building site, Hampstead Road, N.W.1, 1966.

PRUNELLA VULGARIS L. In turf, Finsbury Square, E.C.2.

LAMIUM AMPLEXICAULE L. Weed of flower-bed, Lincoln's Inn Fields, W.C.2, 1965, R.M.B. Tower Hill, 1966.

GALEOPSIS BIFIDA Boenn. Stag Place, S.W.1, 1966, D.McC. (Lousley, 1967).

GLECHOMA HEDERACEA L. Tower Hill, 1966. Wellington Road, N.W.8, 1966, H.C.H., conf. D.H.K.

PLANTAGINACEAE

PLANTAGO MEDIA L. Plentiful on lawns, Grosvenor Road, S.W.1, 1965.

CAMPANULACEAE

†CAMPANULA RAPUNCULOIDES L. Garden weed, Maida Vale, 1965. Primrose Hill, N.W.3, several colonies, including white-flowered plants, 1966.

DIPSACACEAE

DIPSACUS FULLONUM L. Site of Harrow Road-Edgware Road Flyover, Lisson Street, N.W.1, 1966.

COMPOSITAE

§†HELIANTHUS DECAPETALUS L. (*H. multiflorus* Hort.). *Perennial Sunflower*. N. America. Regents Park, 1966, H.C.H., det. D.H.K.

SENECIO JACOBAEA L. Finsbury Square, E.C.2, 1966.

S. VISCOSUS L. Site of Harrow Road-Edgware Road Flyover, Lisson Street, N.W.1, 1966. Railway tracks, Edgware Road Station, 1966.

GNAPHALIUM ULIGINOSUM L. Nine Elms Goods Yard, S.W.8, 1966. Stag Place, S.W.1, 1966, D.McC. (Lousley, 1967).

§ANTHEMIS COTULA L. *Stinking Mayweed*. Abundant in a flower-bed at Sarah Siddons Youth Centre, Harrow Road, W.2, with *Papaver rhoeas*, *Anagallis arvensis*, *Veronica persica*, *V. polita* and *Centaurea cyanus*, 1965-66.

†ARTEMISIA VERLATORUM Lamotte. The colony at Paddington Green was destroyed by building operations in 1965. Waste ground, Phoenix Road, N.W.1, 1965. Waste ground, Hoxton, 1966. Car park, East Smithfield, E.1, 1966, A.Br.

†A. ABSINTHIUM L. Nine Elms Goods Yard, S.W.8, one plant, 1966, A.Br., D.P.Y., E.J.C. and R.C.

§*†TAGETES MINUTA L. S. America. Kensington Gardens, near Lancaster Gate, 1965, B.Wu.

- CENTAUREA SCABIOSA L. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.
- *†C. CYANUS L. Weed of flower-bed, Sarah Siddons Youth Centre, Harrow Road, W.2, with *Papaver rhoeas*, *Anagallis arvensis*, *Veronica persica*, *V. polita* and *Anthemis cotula*, 1965-66.
- C. NIGRA L. Finsbury Square, E.C.2, 1966. Building site at south end of Waterloo Bridge, R.M.B. (Lousley, 1967).
- §*†C. SOLSTITIALIS L. *St. Barnaby's Thistle*. Europe. In a flower-tub, Mansell Street, S.W.1, 1965, D.McC. (Lousley, 1966).
- LEONTODON TARAXACOIDES (Vill.) Mérat. New turf in the middle of Hyde Park Corner, 1965, A.Br.
- *PICRIS ECHIOIDES L. Near Dorchester Hotel, W.1, 1965, D.E.A.
- †CICERBITA MACROPHYLLA (Willd.) Wallr. South Lambeth, 1965, A.Br.
- HIERACIUM EXOTERICUM Jord. Regents Park, 1966, A.Br.
- §H. CHERIENSE Jord. ex Boreau. Near Festival Hall, S.E.1, 1966, J.E.L., det. P.D.S.

LILIACEAE

- §POLYGONATUM MULTIFLORUM (L.) All. *Solomon's Seal*. Old shrubbery, Battersea Park, 1965, R.C.
- §†ASPARAGUS OFFICINALIS L. *Asparagus*. Bird-sown from gardens. Very rare. Trinity Square, E.C.3, 1966.

JUNCACEAE

- †JUNCUS TENUIS Willd. Regents Park, 1965, D.E.A. and J.J.P.
- J. BUFONIUS L. Weed of flower-beds, Zoological Gardens, Regents Park, 1966, A.Br.

COMMELINACEAE

- §†TRADESCANTIA VIRGINIANA L. *Virginian Spiderwort*. N. America. Garden outcast. Established on waste ground, Porteus Road, W.2, for at least ten years, 1965.

CYPERACEAE

- CAREX HIRTA L. Battersea Park, 1965, R.C. West Lodge, Prince of Wales Gate, Hyde Park, 1966, A.Br.
- §C. DIVULSA Stokes. North bank of Thames just east of Chelsea Bridge, 1965, R.M.B. (Lousley, 1966). St. Johns Wood Churchyard, 1966, H.C.H.
- C. SPICATA Huds. Bank by canal, Zoological Gardens, Regents Park, 1966, A.Br.

GRAMINEAE

- MOLINIA CAERULEA (L.) Moench. Shrubbery at edge of Knightsbridge, S.W.1, presumably introduced with peat, 1965, A.Br.
- *†LOLIUM RIGIDUM Gand. New shrubbery bed at edge of Knightsbridge, S.W.1, 1965, A.Br.
- POA NEMORALIS L. Site of Luxborough Lodge, Marylebone Road, N.W.1, 1966, A.Br.
- §P. COMPRESSA L. *Flattened Poa*. Very rare. Wall of Tower of London, 1966, A.Br.
- §P. SUBCAERULEA Sm. Flower-bed by lake, St. James's Park, 1965, A.Br.

- †P. PALUSTRIS L. Regents Park, 1966, H.C.H., conf. D.H.K. and J.E.L.
 BROMUS LEPIDUS Holmberg. Regents Park, 1966, H.C.H., conf. D.H.K.
- §†B. CARINATUS Hook. & Arn. *Californian Brome*. N. America. Inner Circle, Regents Park, between Gloucester Gate and the entrance to the Zoological Gardens, 1966, A.Br., H.C.H., det. D.H.K.
- †AVENA FATUA L. Mornington Terrace, N.W.1, 1965.
- §*†A. STRIGOSA Schreb. *Black Oat*. Europe. South Lambeth, 1965, A.Br.
- AGROSTIS CANINA L. Weed of flower-beds, Zoological Gardens, Regents Park, 1966, A.Br.
- §†A. SCABRA Willd. N. America. Dominant over some 50 yards of trackway at Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E. J. C. and R.C. (Lousley, 1967).
- §*†ERAGROSTIS PARVIFLORA (R.Br.) Trin. Europe. Shrubbery bed at edge of Knightsbridge, 1965, A.Br.
- †ALOPECURUS MYOSUROIDES L. Holborn, W.C., several plants around the base of a tree, 1966. Site of Knightsbridge Barracks, S.W.1, 1966; weed of flower-beds, Zoological Gardens, Regents Park, 1966, A.Br. Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C.
- §*†BRACHIARIA MARLOTHII (Hack.) Steud. S. Africa. Spontaneously in a pot of cacti in an office at Paddington, 1965, D.T., det. J.E.L. (Lousley, 1966).
- §†DIGITARIA SANGUINALIS (L.) Scop. *Finger Grass*. Cosmopolitan. Many plants over a few yards of trackway, Nine Elms Goods Yard, S.W.8, 1966, A.Br., D.P.Y., E.J.C. and R.C. (Lousley, 1967).
- *†SETARIA VIRIDIS (L.) Beauv. New shrubbery bed at edge of Knightsbridge, S.W.1, 1965, Brewis.
- §*†s. LUTESCENS (Weigel) Hubbard. *Yellow Bristle-grass*. Europe. Kensington Gardens, a single plant, 1966, B.Wu.
- §*†TRITICUM DURUM Desf. *Macaroni*. South Lambeth, 1965, A.Br., det. C.E.H.

REFERENCES

- KENT, D. H., 1960, A Contribution to the Flora of Central London. *Lond. Nat.*, 39, 41-62.
 ———, 1961, A Contribution to the Flora of Central London: Addend. *Lond. Nat.*, 40, 28.
 ———, 1962, Additions and Corrections to the Flora of Central London. *Lond. Nat.*, 41, 16-22.
 ———, 1965, Further Additions and Corrections to the Flora of Central London. *Lond. Nat.*, 44, 18-28.
- LOUSLEY, J. E., 1966, Botanical records for 1965, *Lond. Nat.*, 45, 17-21.
 ———, 1967, Botanical records for 1966. *Lond. Nat.*, 46, 10-14.

Notes on Some Middlesex Grasses

By DOUGLAS H. KENT

AN intensive study of the flora of Middlesex during the last two years in connection with the L.N.H.S. Distribution Maps Scheme has led to a wider knowledge of the distribution and recent spread of many plant species, and especially so in the Gramineae. The following notes on Middlesex grasses are based on field observations by myself and friends, and will I hope stimulate interest in other parts of the London Area on a family of plants which is too often neglected as being highly critical.

Festuca heterophylla Lam. Various-leaved Fescue. The discovery of this European adventive in woodland on Hampstead Heath by J. Palmer (Lousley, 1967) is of considerable interest as it is the first certain record for the vice-county. *F. heterophylla* was formerly sown in woodlands with other exotic species, and is of rare occurrence in the London Area. The grass is described and figured by Hubbard (1954).

Vulpia myuros (L.) C. C. Gmel. Rat's-tail Fescue. Trimen and Dyer (1869), describe this bizarre species as being "rather rare", and define its habitats as "Walls, rarely on dry ground". Hubbard (1954), gives an excellent description and illustration of the grass, and mentions that it is much less common and far less widely distributed than its ally *V. bromoides*, but that it is more frequent and probably native in southern England, Wales and Ireland, but comparatively rare and introduced in northern England and Scotland. Its habitats are given as waste and cultivated ground, roadsides, dry sandy or gravelly places, and occasionally as a weed in sown hay-fields. In present day Middlesex *V. myuros* is very rarely seen on walls, but still occurs in a few dry places, chiefly on light soils, where it is rare. Kent and Lousley (1956-57), referred to the occurrence of the plant as an introduction on railway tracks, and recorded it from railway sidings at Greenford. It is now clear that *V. myuros* is rapidly colonising railway tracks and premises and is locally common and spreading quite fast. Since 1964 it has been noted in such habitats in the following localities: between Uxbridge and Denham, abundant; between Staines West and Colnbrook, frequent; Staines to Ashford, frequent; Scratch Wood sidings, Edgwarebury; Mill Hill, abundant; Neasden; Wembley Hill; Southall to Brentford, abundant; West Ealing, abundant; Enfield Town and Wood Green. Thus it will be seen that the species is widely distributed and increasing in its artificial habitat, although it is still rare and decreasing in more natural habitats.

Puccinellia distans (L.) Parl. Reflexed Salt-marsh-Grass. Trimen and Dyer (1869) refer to this species as being very rare and confined to waste places. Four Middlesex records are given for the grass, of which two were made before 1850. The remaining two records are "Isle of Dogs, a single plant, 1866" and "On the new soil of the Thames Embankment opposite Somerset House, 1866". In the former locality the grass may have been native, in the latter it was obviously an introduction. Warren (1871) records the species as being "casual about Hyde Park", and Cooper (1914) reports it as a casual from Finchley, 1910 and Hackney Marshes 1909-12, Cooper further records it from the latter locality as late as 1920 in Kent and Lousley (1956-57). During 1945, J. E. Lousley gathered the plant from a bombed site by Cripplegate Institute, E.C.

The first record of *P. distans* as an established grass in Middlesex was made in 1949 when R. A. Boniface and Dr. F. Rose discovered it growing abundantly in a marshy field near Yeading, in association with *Aster tripolium* (Lousley, 1950). The plant persisted there for many years, and although the field is now enclosed by a high fence it is likely that it survives. In 1965, in company with B. Wurzell, I discovered the plant growing in vast quantity for a considerable distance along the canal towing-path near West Drayton (Lousley, 1966), and in 1966 it was equally plentiful and appeared to be extending its range. During 1966, in company with Miss M. E. Kennedy, I again encountered *P. distans* growing in quantity, on this occasion in wet marshy ground by a gravel pit north of Enfield Lock, in association with *Triglochin palustris*.

Hubbard (1954) refers to its typical habitats as on mud in the higher parts of salt-marshes, or on sandy and gravelly soils, and among rocks in coastal areas but mentions also that it is sometimes found occasionally in river-meadows, on waste land, etc. On this evidence the populations at Enfield may be native, but on considering the history of the species in the county as a whole it appears more probably that *P. distans* is an introduction.

Nardurus maritimus (L.) Murb. This diminutive and very rare grass was discovered by myself in 1951, growing in small quantity on railway tracks between Uxbridge and Denham (Lousley, 1952). Visits to the area in subsequent years were unsuccessful, until 1960 when a few plants were again noted. Since that time the railway branch line has fallen into disuse and much of the track has been removed. The area where *N. maritimus* grew, however, was less affected than the area nearer Uxbridge.

In 1966, B. Wurzell discovered a large colony of the grass growing in a tangled mass with *Hieracium pilosella* on a small area of railway bank some 300 yards north of my 1951 locality. Here, the plant has all the appearance of being native, and this was undoubtedly the main colony from which the plants recorded in earlier years had spread.

N. maritimus has a very interesting history in Britain which is given in detail by Stace (1961), who also provided a good description and excellent figure of the grass. It is a species of barish ground, particularly on calcareous soils, and although its status in Britain is uncertain, Hubbard (1936), was inclined to consider that it might be native, at least in some of its localities. The species has recently been discovered in W. Kent and Surrey, and should be searched for in other parts of the London Area

Poa compressa L. Flattened Meadow-grass. Trimen and Dyer (1869) refer to this species as "rather rare", and define its habitats as "walls and dry banks". They cite nine records for the county, and four of these are from localities in the vicinity of the Thames. Recent studies have shown that *P. compressa* is best regarded as local than rather rare, and that in the vicinity of the Thames, particularly on the river wall, it is often locally plentiful.

Since 1964 it has been seen at Cowley; Harefield; Teddington; near Kingston Bridge; Penton Hook Lock; West Drayton; Ashford; Isleworth; Twickenham; Hounslow Heath; Sudbury Hill; Osterley Park; Hanwell; Brentford; Enfield, and on the walls of the Tower of London, the latter record being contributed by Lady Anne Brewis.

Poa subcaerulea Sm. Spreading Meadow-grass. This very variable, and much misunderstood segregate of *P. pratensis* L. *sensu lato*, is well described and figured by Hubbard (1954) who refers to it as a species of

marshy pastures and meadows, on stream- and river-sides, damp coastal sands, and moist mountain slopes. It is also said to be most frequent in the northern part of the British Isles, becoming scarce southwards, and very rare in the south of England. Barling (1962) showed that it was locally common in a variety of habitats including permanent grasslands, road-verges, waste places, walls and sand dunes in South Wales, and he also discusses the great variability found within the species. Recent work on the *P. pratensis* group in Middlesex has led me to the conclusion that *P. subcaerulea* is locally plentiful in the county in damp grassy places, especially near the Thames. Since 1964 it has been noted in the following localities: Between Uxbridge and Denham; near Swakeleys. Bushy Park, frequent! E. J. Clement, conf. C. E. Hubbard. Hampton Court Park; Staines Cemetery; Staines Moor; Stanwell Moor; Laleham; Shepperton; Sunbury; West Heath, Hampstead, locally frequent (a specimen gathered from here by H. Trimen in 1860 is in Herb. Mus. Brit.); Harrow; Syon Park; near Potters Bar; Enfield; East Heath, Hampstead; Ken Wood grounds and St. James's Park. The records from Laleham, near Potters Bar and Enfield were made in the company of Miss M. E. Kennedy, and that from St. James's Park was contributed by Lady Anne Brewis.

Poa palustris L. Swamp Meadow-grass. This variable and very rare grass is described and figured by Hubbard (1954), who points out that its presence in the British Isles may be due entirely to its past cultivation as a fodder grass. In the London Area it has been recorded at various times from a number of habitats ranging from marshes and streamsides to waste ground and rubbish-tips. Only two pre-1945 records have been traced for Middlesex, viz. Uxbridge, 1921, Lady Davy (*Rep. Bot. Soc. & E.C.* 6, 403) and old market garden, Isleworth, 1933, C. E. Hubbard (Hb. Kew). From 1945 onwards it has been reported at intervals from Hyde Park and Kensington Gardens, and in 1945 was collected at Shadwell Basin, by J. E. Lousley, and in 1954 was gathered on a bombed site in Upper Thames Street, E.C.4, by R. A. Graham. Specimens from both these localities are in Herb. J. E. Lousley. During 1955, *P. palustris* was recorded from a swamp by the lake in Chiswick House grounds by R. A. Boniface (Kent and Lousley, 1956-57), here it persisted until *c.* 1959 when the swamp was partially drained.

During 1966, E. J. Clement discovered a fine colony on the river wall at Hampton Court (specimen confirmed by Dr. C. E. Hubbard), and H. C. Holme gathered the species in Regents Park (specimen confirmed by J. E. Lousley and D. H. Kent).

Bromus diandrus Roth. Great Brome. This native of the Mediterranean, which superficially resembles a very robust form of *B. sterilis* is extensively naturalised on cultivated and waste ground on sandy soils in various parts of Breckland. The earliest evidence of its occurrence in Middlesex is a specimen collected from Muswell Hill, where it was presumably casual, by J. E. Cooper in 1907. Cooper later gathered it at Yiewsley in 1909 and 1911, and here the species may have been established. In 1953, Mrs. B. Welch discovered it growing in some quantity on a rubbish-tip at Greenford (Kent and Lousley, 1956-57).

During 1966, R. A. Boniface found *B. diandrus* growing abundantly on waste ground at Brentford, and I noted it growing at Greenford, Perivale, and as an abundant weed of flower-beds, etc., at Myddleton House grounds, Enfield, the latter record being made in company with Miss M. E. Kennedy. My impression is that *B. diandrus* is probably well established

in a number of places in the London Area but is being overlooked as a robust form of *B. sterilis*. The species is well described and figured by Hubbard (1954).

Bromus carinatus Hook. and Arn. Californian Brome. This attractive N. American species was cultivated at the Royal Botanic Gardens, Kew, Surrey, and was first noted as an escape on the Thames towing-path by Dr. C. E. Hubbard about 1919. It is now abundantly naturalised on the Surrey bank of the river from near Hammersmith Bridge to beyond Richmond. Rather curiously it was not recorded from Middlesex until 1945, when a few plants were seen on the river-wall between Kew Bridge and Brentford (Kent, 1948). In the years that followed it was noted in a number of localities by the Thames between Chiswick and Brentford. During 1951, Mrs. L. M. P. Small noted it on a bombed site at Ealing, and Mrs. B. Welch recorded it from a rubbish-tip at Hanwell (Kent and Lousley, 1956-57). At about the same time I noted it on a rubbish-tip at Greenford, and in 1960 discovered it growing in quantity at Gunnersbury Park, Acton.

By 1964 *B. carinatus* was locally abundant in a number of areas by the Thames from Brentford to Chiswick Mall, naturalised plentifully in Gunnersbury Park, Acton, still surviving in small quantity on waste ground at Ealing, and spreading rapidly along the banks of the Brent at Greenford. During the last two years its continued spread has been traced to the following localities: Gravel pits, East Bedfont, 1965!, J. Mason (Lousley, 1966); increasing and spreading, 1966. Hounslow Heath, 1965, B. Wurzell. Thames side, Twickenham, in quantity, 1965→; Duck's Walk, Isleworth, a few plants on the river wall of the Thames, 1966; road verges, Great West Road Brentford and disturbed waste ground between Brentford and Hanwell, 1965→; waste ground, Hammersmith Broadway, 1965 and Regents Park, 1966, the latter record being contributed by Lady Anne Brewis. It is clear that *B. carinatus* is now spreading very rapidly in the county, especially near the Thames, though searches at Fulham, Teddington and Hampton Court have failed, as yet, to reveal its presence. It is a conspicuous grass, very superficially resembling *B. ramosus*, but it has strongly compressed oblong 6-12-flowered spikelets, with long-awned 7-8 nerved lemmas (awn 5-10 mm. long). The grass also remains green throughout the winter and may sometimes be found flowering in sheltered situations in mid-December. The spread of this interesting species should be carefully noted.

REFERENCES

- BARLING, D. M., 1962, Studies in the biology of *Poa subcaerulea* Sm., *Watsonia*, 5, 163-173.
 COOPER, J. E., 1914, Casual and alien plants in Middlesex. *J. Bot.*, 52, 127-131.
 HUBBARD, C. E., 1936, *Nardus maritimus*. *Proc. Linn. Soc.*, 148, 109-110.
 ———, 1954, *Grasses: A Guide to their Structure, Identification, Uses and Distribution in the British Isles*. Penguin Books Ltd., Harmondsworth.
 KENT, D. H., 1948, Middlesex plant records for 1947. *Lond. Nat.*, 27, 29-35.
 KENT, D. H. and LOUSLEY, J. E., 1956-57, A Hand List of the Plants of the London Area: Gramineae. *Supplement to Lond. Nat.*, 35-35.
 LOUSLEY, J. E., 1950, Botanical records for 1949. *Lond. Nat.*, 29, 8-14.
 ———, 1952, Botanical records for 1951. *Lond. Nat.*, 31, 10-13.
 ———, 1966, Botanical records for 1965. *Lond. Nat.*, 45, 17-21.
 ———, 1967, Botanical records for 1966. *Lond. Nat.*, 46,
 STACE, C. A., 1961, *Nardurus maritimus* (L.) Murb. in Britain. *Proc. Bot. Soc. Brit. Isles*, 4, 248-261.
 TRIMEN, H. and DYER, W. T. THISELTON, 1869, *Flora of Middlesex*. London.
 WARREN, J. B. L., 1871, The flora of Hyde Park and Kensington Gardens. *J. Bot.*, 9, 227-238.

Notes on Mammals in the London Area for 1965

By JOHN A. BURTON

THE notes on mammals follow the pattern set out in the previous issue of the *London Naturalist* (Burton, 1966a). Progress reports on the mapping of distribution are given as well as maps for selected species.

The maps published last year have stimulated many readers to send in records to help fill in the unknown areas and it will enable maps to be republished from time to time to show additional information or changes in distribution.

This year, the format of the systematic list of mammals observed in the London Area has been changed: instead of detailed notes, there are more general comments on the state of our knowledge of each species.

Record sheets are available from the Recorder (address in Programme and should be used if possible, as it helps to standardise the information received.

The numbers are from Corbet (1964).

I should like to thank everyone who sent in records and apologise to anyone inadvertently omitted from the list of observers. My special thanks go to I. R. Beames, Dr. G. B. Corbet, A. M. Hutson, P. A. Morris and P. C. Tinning.

LIST OF OBSERVERS

D. Alford, E. F. Anderson, M. S. Andrews, Mrs. R. Annis, J. Auburn, I. R. Beames, Mrs. L. A. Beames, Dr. G. Beven, A. F. Blakeley, Miss L. Braham, Miss E. P. Brown, J. A. Burton, N. J. Burton, C. P. Castell, Miss O. K. Chapman, G. Clark, J. Cooper, Mrs. Edge, G. S. T. Elliot, Mrs. Elson, R. Ember, A. V. Fisher, H. J. Freeman, Mrs. P. A. Freshwater, P. D. Gann, Mrs. P. Goldsmith, P. J. Grant, V. Green, G. H. Gush, R. Hanks, D. L. Harrison, Miss E. M. Hillman, G. Holland, F. J. Holroyde, J. Houston, K. H. Hyatt, P. J. Joiner, Miss M. E. Kennedy, R. Kettle, J. Keys, A. S. Keith, W. Killpack, H. King, R. King-Farrow, P. Kinnear, J. Laundon, D. Lilliman, I. G. Manklow, L. Manns, J. L. Mason, J. Morris, P. A. Morris, A. F. Mussellwhite, P. J. Oliver, A. Paine, R. Parnell, R. C. Reeves, S. M. Singleton, S. G. Shippard, Mrs. L. M. P. Small, S. D. G. Stephens, W. W. Thompson, P. C. Tinning, Mrs. P. Tinning, G. Town, Mrs. B. Walker, C. A. Walker, Mrs. M. Waller, R. B. Warren, J. P. Widgery, R. P. Widgery, R. V. White, P. J. Wilson, Miss Woads, Dr. D. W. Yalden.

SYSTEMATIC LIST 1965

INSECTIVORA

1. HEDGEHOG. *Erinaceus europaeus* L.

A paper on this species appeared in last year's *London Naturalist* (Morris, 1966). No significant changes in status have been noted, but records are still required from all parts of the area.

2. MOLE. *Talpa europaea* L.

3. COMMON SHREW. *Sorex araneus* L.

A note on this species, with distribution map, published last year (Burton, 1966b) stimulated observers to send in further observations and it is hoped that more records will be forthcoming.

4. PYGMY SHREW. *Sorex minutus* L.

Records of this species increased during the period under review, as they are fairly commonly encountered in bottles (Morris and Harper, 1965). It should be possible to publish a distribution map for this species fairly soon. Records are needed from Essex and Middlesex in particular.

5. WATER SHREW. *Neomys fodiens* (Pennant)

No significant changes have been noted in this species.

CHIROPTERA

It is hoped to produce a paper on bats next year, as there has been a very large increase in the number of records. Nearly all these records have come from a small group of observers and further records are needed from all parts of the area. It is almost impossible to identify most species of bat in flight, with any degree of certainty, but they can often be identified from specimens in a very poor state of preservation, found as road casualties, etc.

CARNIVORA

24. FOX. *Vulpes vulpes* (L.)

A paper on this species appears on page 44.

27. STOAT. *Mustela erminea* L.28. WEASEL. *Mustela nivalis* L.

The distribution maps published last year have stimulated several observers to send in records. If this continues and records from Essex N. Kent, W. Middlesex and Herts. are sent in, the maps will be revised and published shortly.

31. BADGER. *Meles meles* (L.)

A paper is in preparation for this species and outstanding records, including old records should be sent to the recorder.

Some records have come from Middlesex and any additional information from this county would be very welcome.

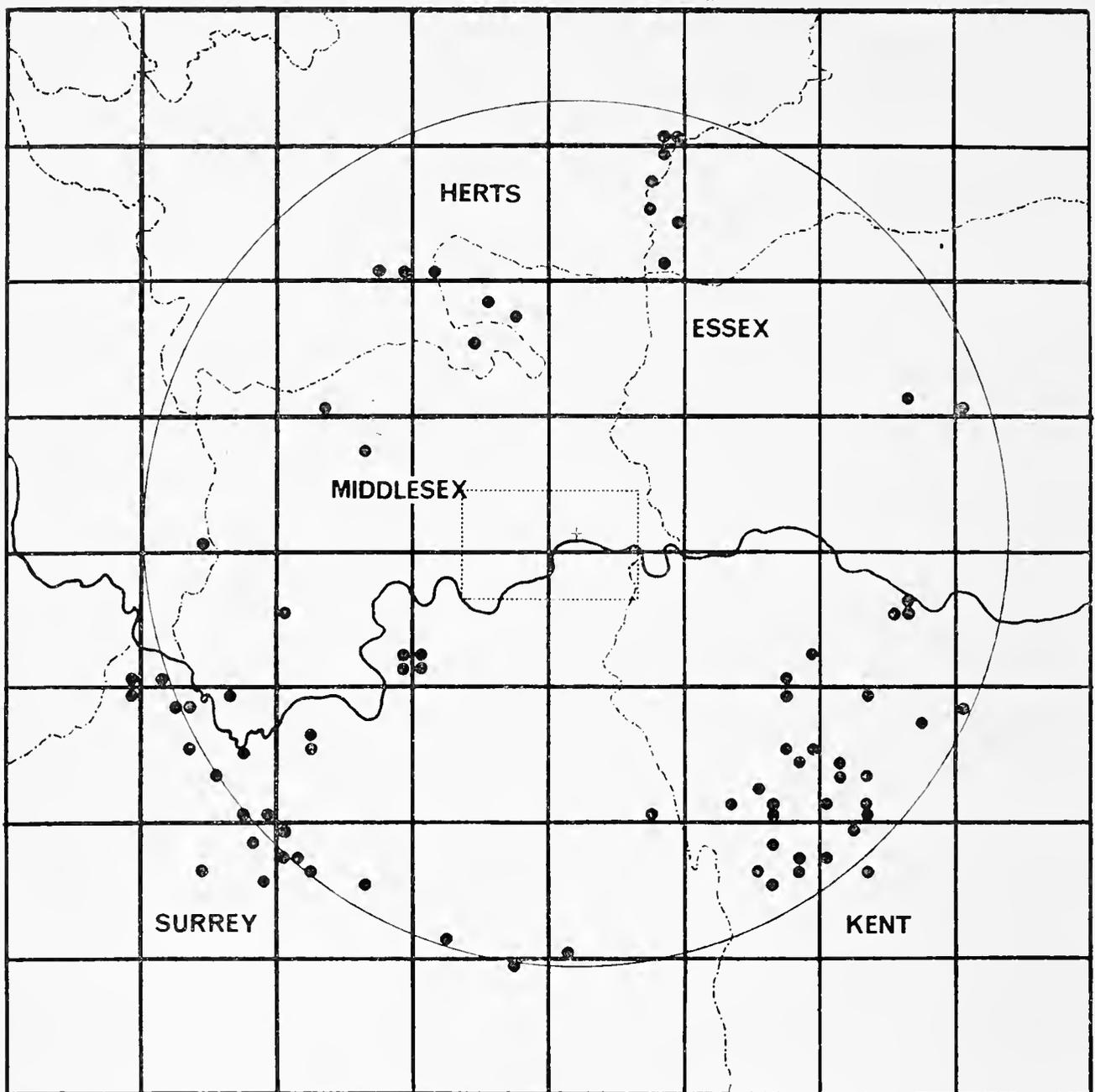
ARTIODACTYLA

Since publication of last year's report reports have come in from various parts of the area of wild deer and feral deer.

LAGOMORPHA

53. BROWN HARE. *Lepus capensis* L.

A map of this species accompanies this report. This species is thought to be declining in the London Area by many observers. It is still fairly common in some parts of the London Area. In Kent, they are still seen frequently and are fairly widespread. In Surrey they are much thinner on the ground, and they are hardly likely to be overlooked as some of the most detailed mammal studies have been made in the area centred on Esher. Fewer records are sent in from North of the Thames but the information available states that they are "seen frequently". Most of the records come from along the Herts./Middlesex and Herts./Essex



Distribution of the Brown Hare (*Lepus capensis*).

borders. This reflects the distribution of observers and the Brown Hare is almost certainly very widespread and locally abundant in Herts. Any information, particularly that which conflicts with the distribution indicated on the map would be most useful together with any other relevant information such as: changes in the nature of the land; increase or decrease in shooting, competition with rabbits, etc.

55. RABBIT. *Oryctolagus cuniculus* (L.)

Although an appeal was made last year for records of this species very little information has been received.

57. GREY SQUIRREL. *Sciurus carolinensis* Gmelin

Work has started on a paper dealing with this species but more information is needed from suburban areas particularly those listed below, as little up to date information is available: Wood Green (M), Hendon (M), Hayes (M), Barnes (S), Wanstead (E), Dartford (K).

Since the last report another albino grey squirrel has been reported from Richmond Park; a new locality. Any further records of albinos or partial albino grey squirrels would be welcome.

RODENTIA

59. DORMOUSE. *Muscardinus avellanarius*

This species was recorded in the L.N.H.S. area, but details are being suppressed at this moment on account of the scarcity of this species.

61. HARVEST MOUSE. *Micromys minutus* (Pallas)

Since Teagle's paper (Teagle, 1964) there have been few records sent in for this species. It is hoped that observers will continue to send in information. Interesting new localities are at Brentford (RBW) and Thorpe (GHG).

62. WOOD MOUSE. *Apodemus sylvaticus* (L.)63. YELLOW-NECKED MOUSE. *Apodemus flavicollis* (Melchior.)

A map has been prepared for these two species, but more records are needed from suburban areas particularly in the south and south-west, before it can be usefully published.

67. BANK VOLE. *Clethrionomys glareolus* (Schreber)68. WATER VOLE. *Arvicola terrestris* (L.)69. SHORT-TAILED VOLE. *Microtus agrestis* (L.)

Records of these three species are being submitted with increasing frequency, but more records are still needed from all parts of the L.N.H.S. area.

SUMMARY

It would appear from the above notes that records are needed for every species. This is of course true to a greater or lesser degree. Some species are fairly well covered, but it is important that this is maintained over the years so that changes can be observed. Other species, such as Brown Hare, are only well covered in small parts of the L.N.H.S. area while some are badly covered throughout the area. A good example of the latter is the Rabbit. I would like to make an appeal to members to send all records of rabbit; no record is too trivial.

If sufficient information can be gathered, maps of the following species will be published next year: Badger, Rabbit, Grey Squirrel, Wood Mouse and bats.

REFERENCES

- BURTON, J. A., 1966a, Notes on Mammals of the London Area During 1963 and 1964. *Lond. Nat.*, 45, 35-42.
 BURTON, J. A., 1966b, The Distribution of Weasel, Stoat, Common Shrew, Roe Deer, Water Shrew and Mole in the London Area. *Lond. Nat.*, 45, 35-42.
 CORBET, G. B., 1964, *The identification of British Mammals*. London, British Museum (Natural History).
 MORRIS, P., 1966, The Hedgehog in London. *Lond. Nat.*, 45, 43-49.
 HARPER, J. F. and MORRIS, P. A., 1965, The Occurrence of small mammals in discarded bottles. *Proc. Zoo. Lond.*, Vol. 145 pt. 1, 148-153.
-

The Fox in the London Suburbs

By W. G. TEAGLE

INTRODUCTION

THE animal which is the subject of this paper is known to science as the Red Fox *Vulpes vulpes* (L.), but to most of us it is simply *the* Fox. It occupies a special place in the bestiary of the ordinary man. No English-speaking child can learn to read without becoming aware of its existence, for the very brevity of its name ensures an early introduction, and in later years aspiring typists may tap out recognition of its superiority over the lazy dog. Such expressions as "gone to earth" are in common use, and occasionally a member of the fair sex may earn for herself the title of "vixen". Our newspapers regularly devote a paragraph or two to the exploits of Reynard, while the daily doings of hares, voles, shrews and squirrels may go unnoticed and unsung.

In recent years the Fox has been given considerable publicity because of its activities in the suburbs of London and other cities, and late in 1959 it was suggested that an enquiry should be conducted into the animal's distribution in the London Natural History Society's Area, a circle of 20-mile radius from St. Paul's Cathedral. I had just agreed to undertake a survey of the distribution of the Badger *Meles meles* around London, and since Badger setts are often found to be used by Foxes, it was thought the range of the two species could be investigated simultaneously.

The amount of information on Foxes obtained whilst investigating Badger setts was not insignificant, but other sources proved more profitable. Many members of the Society and other naturalists sent in interesting material, and I am also greatly indebted to the many officials of the Ministry of Agriculture, Fisheries and Food to whom I was introduced through the kindly interest shown by Mr. Harry V. Thompson and Miss Margaret Neve of that Department. A full list of contributors of records appears at the end of this paper.

It was my original intention to prepare an account of the distribution of the Fox over the *whole* of the L.N.H.S. Area. Unfortunately very little information was received from members living in the Hertfordshire and Essex sectors, with the result that the draft distribution map suggested that the animal was far more abundant south of the Thames than it was north of the Middlesex border and east of the River Lea. The same pattern is shown in distribution maps of other mammalian species published by Burton (1966) and Morris (1966), and to some extent reflects the distribution of interested observers rather than that of the animals. Opportunities for me to investigate the neglected northern areas from my South London base were few and the occasional field trip, made before my departure from London early in 1963, produced very little.

Some modification of the original plan had to be considered, and from the available material it became apparent that the real interest in London's Foxes lay in their success as inhabitants of suburbia. The present paper therefore concentrates on that aspect. It is hoped that the evident shortcomings of the account will prompt others to extend the study, not only around London but in other built-up areas where the Fox is becoming firmly established.

DETECTION OF THE FOX

Few people could live near Foxes without becoming aware of their presence. Foxes can be seen, heard and smelt; they cause visible damage. Fortunately for a Recorder of Mammals the Fox is a relatively large mammal of familiar appearance. Sight records of Foxes are nearly always acceptable, and this can be said of very few other British mammals. They can be watched in daylight, and at night they may appear under the street lamps or in the headlights of a car. They have been admired, but also shot at, from bedroom windows; they have been glimpsed from railway compartments. The occasional corpse on a busy road provides additional proof of their presence.

Observers have at times been confident enough to state that the animal seen was a "vixen" or a "dog Fox", but, as pointed out by Hurrell (1962) and Vesey-Fitzgerald (1965), it is very difficult to tell the sex of a Fox in the field. No faith can be put in the statement that a dog Fox has a white tip to its brush and that the female has not. Nor is size an infallible guide. Generally the dog is bigger than the vixen, but it is not always possible to judge size with accuracy when only one animal is seen, and there can be quite small dogs and quite large vixens. Vesey-Fitzgerald (*op. cit.*) reports an adult vixen weighing just over 14 lbs. and an adult dog of only 11 pounds, and both from the same district.

There is a strong popular belief that voice is a more reliable indication of sex, that a vixen screams and a dog Fox barks, but there now seems to be some disagreement on this amongst naturalists. Until more research has been carried out it would be safer not to comment on the reliability of this method.

Foxes leave a number of signs. Their smell is unmistakable*, once learned, never forgotten, and a mammalogist searching for Foxes uses his nose as much as an ornithologist uses his ears. It is often possible to pick up the scent during the course of a walk. All large excavated holes are worth sniffing at, and often there is no need to bend down to savour the full strength of the effluvium. It would be interesting to know how long, given favourable atmospheric and ground conditions, the scent of a Fox may linger after the animal's passing. I bottled some Fox-scented sawdust in a screw-top honey jar in 1962, and at the time of writing (February, 1967) the smell retains much of its original quality.

One of the uses of scent in mammals is to mark out territory. It thus fulfills a similar function to bird song, but without earning for the mammals the human approval showered upon the avian species by poet, playwright and composer. The Fox is very well endowed with scent glands. Corbet (1966) mentions one on the tail, a pair by the anus, and "probably one associated with the urinal tract", but admits that the precise part each plays in the animal's social life is not known. Nothing in the authoritative literature I have been able to examine really explains which gland (or glands?) emit the secretion with the typical vulpine odour. References to the marking of home territory by urination (Southern, 1964) suggests the involvement of the third on Corbet's list. Vesey-Fitzgerald (1965), however, claims that a Fox's "normal" urine has no strong smell.

Fox droppings containing feathers, fur and bone are fairly easy to recognise. The excrement breaks as it is ejected so that one finds a group

*It might be argued by a purist that the smell of some other members of the *Canidae* resembles it, but these are hardly likely to be encountered in the English countryside.

of two or three grey pieces with a superficial resemblance to bird of prey pellets. Some were, in fact, submitted in response to an appeal for owl pellets. The bones they contained had been chewed up and the bird remains included, not only the smaller covert feathers that occur in hawk and owl pellets, but the bitten-off quill bases of the larger feathers. Unfortunately none of the London material was measured, but twenty faecal "pellets" (eight groups) collected from a rural locality outside the L.N.H.S. Area had an average length of 5.0 cm., and ranged in size from 3.4 to 8.6 cm. One might expect the excreta of Foxes which scavenge in dustbins or feed on household scraps to have a somewhat different appearance from those of Foxes on a more "normal" diet. Dr. G. Beven (*in litt.*) expressed the opinion that because they contained less fur and feather than those found in the country, the droppings of suburban Foxes were rather less easy to distinguish from those of domestic dogs.

Remains of poultry, pigeons and other birds can indicate the predatory activities of a Fox, indisputably when found outside the entrance to an earth. The animal is, however, a scavenger as well as a hunter, and has no objection to eating carrion. Droppings may be found and scent detected near the remains of a meal, or even by a corpse which has been rejected as not worth eating. An emaciated Lapwing *Vanellus vanellus* found dead after the severe winter of 1963 gave off a strong smell of Fox when it was examined.

Bones and feathers found outside the entrance to a Badger sett may be taken to indicate that Foxes have moved in. Normally Badgers will not take food back to a sett, although this has recently been recorded in Leicestershire (Whall, 1963). Fox scent and Fox droppings usually establish the identity of the new tenants, however.

Hairs may be found at the entrance to an earth, some of which, because of their appearance and other qualities may be correctly assumed to have belonged to a Fox, and might be confirmed as such by microscopic examination. It should be remembered, however, that dogs, with variously coloured and textured coats, are usually interested in holes and may leave their hairs behind them. They can also account for a confusion of footprints which might obliterate those of the real hole-dweller.

The animal's tracks may be found, but normally only a fall of snow will enable one to find such evidence in a suburban road or across the mown lawns of a park or garden. Fox tracks could be confused with those of a domestic dog of comparable size. Leutscher (1960) describes a Fox's prints as "neater and narrower" than a dog's, with a small, more rounded ball print and finer claw prints, and the trail as "more purposeful", with the prints forming a straight line, one directly in front of another.

Dog prints will often be found accompanying those of a human being, but not all dogs walk to heel. Unescorted and even ownerless dogs are common, and Foxes may sometimes follow men's paths. The statement (Leutscher, *op. cit.*) that a Fox trail may "sometimes lead one into an area of human occupation" rather overlooks the fact that in the London suburbs, *Homo sapiens* and *Vulpes vulpes* may even share the same back garden.

The fact that hind foot prints may "register" (i.e. be superimposed on fore prints) does not necessarily prove that their maker was a Fox. I have seen dog prints which registered.

There is a good deal of hair between a Fox's pads which shows in prints made in wet clay, but some dogs also have very hairy soles to their feet.

An experienced tracker would perhaps have little difficulty in distinguishing vulpine from small canine tracks. I have little confidence in my own ability to do so.

THE AREA CONSIDERED

The map (Fig. 1) shows the main area considered in this paper, and an attempt has been made to indicate the most important open spaces. These include public parks, cemeteries, sewage farms, the grounds of hospitals and other institutions, and waste ground around industrial sites. In some quarters a group of open spaces may constitute several thousand acres of relatively undeveloped land, as for example in Surrey, between Barnes and Kingston-upon-Thames, and in Middlesex, between Hillingdon and Northolt.

It is difficult to decide where London's suburbs really begin and end. No very convincing argument can be put forward to explain why many places which might seem worthy of a different classification (e.g. Leatherhead, Surrey) have been included as "suburbs" in this paper, while large built-up areas like Biggin Hill, Kent, have been excluded. A line had to be drawn somewhere, and Leatherhead has been considered suburban for present purposes because it is linked through Ashted and Epsom with the main built-up area of London, whereas places like Biggin Hill are at present relatively isolated. It is difficult, however, to use this criterion when considering the west side of London. Middlesex, west of the River Crane, is a patchwork of housing development, gravel pits, market gardens, reservoirs, airfields, dumps, wastes and "works". London's suburbs have no clear boundary here, and the choice of the 06 National Grid line as the western limit of the map is arbitrary. Elsewhere the frontiers may not be quite so confused, but they are nevertheless untidy. The eastern Surrey fringe of London presents a curious picture, with glacier-like suburban flows filling long valleys between hills which have retained their woods and chalk grassland.

EARLIER RECORDS, FROM THE 1930s TO 1958

Although Foxes may have only become firmly established in the suburbs in recent years, there are many earlier records of them occurring well within the built-up area. It is not easy, however, to decide which records may refer to wild visitors and which may be of escaped pets.

The late Tom Hinton, Birdkeeper for the Central Royal Parks for most of the first half of the present century, recorded in an unpublished diary that a young Fox "found its way" to Kensington Gardens at the close of 1938. It was first seen by a workman, in the sheep pen which was situated at that time near Peter Pan's statue, and it remained in the Gardens until at least January 21, 1939. Earlier in that month it was seen on the frozen surface of the Long Water, and it was blamed for the death of a young swan found partly eaten on the 4th.

The words "found its way" suggests an unaided wanderer, but when I discussed the incident with Mr. Hinton shortly before his retirement in 1953, he was of the opinion that the animal had been deliberately released.

Fitter (1945) considered that any Foxes seen in the Central Royal Parks and in other urban localities like Peckham and Brixton in South London were almost certainly escapes from captivity, but later (1949) felt that some of the records for the built-up zone could in fact refer to wild invaders from the outer areas. The innermost strongholds of the wild Fox were originally listed (Fitter, 1945) as Hampstead Heath, Kenwood*, Muswell Hill and Mill Hill in Middlesex, Epping Forest and Walthamstow in Essex, Purley, Wimbledon and Richmond Park in Surrey, and Elmstead Woods in Kent.

This does not suggest suburban colonisation on its present scale or at its present depth. Even now Mill Hill and Purley lie at the edge of the suburban sprawl. Hampstead Heath, Kenwood, Richmond Park, Wimbledon Common, Elmstead Woods and Epping Forest are all extensive open spaces of the wilder kind, and the Muswell Hill district is well provided with woods and golf courses. Unlike the parks of Inner London, these green areas have links even today with the more open countryside, although in some cases, especially in the Middlesex sector, these have become rather tenuous. Taylor (1962) thought it might still be possible for the Hampstead Foxes to follow the banks of the Mutton Brook and the Dollis Brook to and from more open country, and later (*in litt.*) expressed the opinion that the railway line from Mill Hill to Highgate provided an even better route. The Foxes of Epping Forest would have much easier access to the country, for although the southern fragments of the Forest have long been engulfed by East London, its main bulk still projects into rural Essex. Elmstead Woods form part of a large complex of woods and other open spaces in the Eltham district, still within easy reach of the Kentish countryside. Walthamstow lies adjacent to the patchily developed corridor of the Lea Valley, where the railway and waterways thread their course through an industrialised wastescape which should provide excellent harbourage for any Foxes moving in from the more rural reaches of the Lea.

The country to the north of Hampstead was little developed at the beginning of the present century, yet Whiting (1912) gives the impression that Foxes were rather unusual on the Heath in his day. They became more familiar animals to the human residents of the district from the early 1930s onwards (Taylor, *op. cit.*), but it may have been with some surprise that readers of *The Times* learned on June 22, 1939 that, on the previous day, a Fox with a dead Rabbit in its jaws was shot from a bedroom window in Wildwood Rise, N.W.3, and that three Foxes had been shot on the Heath within that same week. Fitter (1945 and 1949) mentions depredations on local poultry and the removal of ornamental birds from Golder's Hill Park, a practice still followed by the Foxes' descendants fifteen years later.

Collenette (1937) often encountered Foxes in Richmond Park in the 1930s, and stated that over "the past six years" 116 had been shot in the Park, many of them having probably been bred in the plantations there. It is not known how the Foxes fared during the war years, when the Park was occupied by the Military, but animals were occasionally seen in the

*The name "Ken Wood" should be applied to the mansion, not to the nearby expanse of woodland.

1950s, and lay up in the vegetation at the edge of the Pen Ponds (Ministry of Works, 1953).

There were already signs in the 1940s that the Fox was benefitting from the erosive suburbanisation of the countryside, although this fact was not generally appreciated. Some observers qualified confirmation of the animal's presence in their district by saying it was *still* found, as though it were a relict species for which conditions were not longer favourable. One Hunt Secretary, writing in 1949, considered there were fewer Foxes locally than there had been fifteen years previously, for various reasons, including "more built-up land and more traffic, trippers, hikers, etc." But R. W. Sewell, Joint Master and Honorary Secretary of the Surrey Union Foxhounds, observed in February 1949 (L.N.H.S. records) that the Fox had apparently become "more suburban" and mentioned that there had been a litter of cubs "in the grounds of a hospital quite close to Wallington (Croydon)" and that one could find "an odd one or two around Epsom, Chessington, etc." In the same year, R. C. B. Hendy, Secretary of the West Surrey and Horseill Beagles remarked (L.N.H.S. records) that the Fox had survived the growth of London better than the Brown Hare *Lepus capensis** for, given a quiet spot in which to lie up during the daytime, a Fox "likes to be as near London as he can get", with no aversion to being close to human habitation. He added that Foxes abounded "on the outskirts of such places as Epsom, Leatherhead, Surbiton, Esher and Weybridge".

J. F. Burton's observations in the public open spaces of metropolitan Kent in the late 1940s showed that Foxes were not uncommon there (L.N.H.S. records). He found them, not only at Elmstead Woods, but at Sundridge Park and on the golf course at Shooters Hill. A Fox seen making its way along Shooters Hill Road towards Jack Wood one evening in 1944 may have been the one seen on the same day in Greenwich Park. Another Fox was killed in Greenwich Park on January 19, 1947, after it had destroyed a tame goose.

In his account of the non-avian vertebrates of the Woolwich district, Rigden (1955) included only three notes of the Fox; one heard at Shooters Hill in March 1953, a dog Fox killed by a car in New Eltham in December 1954 and an occurrence at Bostall Heath in February 1955. It was at about this time that Miss E. M. Hillman first noticed Foxes at an earth on a railway embankment in this area.

These last records were all for the area studied by J. F. Burton in the previous decade, and do not suggest any marked change in status. Figures supplied by the Ministry of Agriculture, Fisheries and Food (subsequently referred to as M.A.F.F.), however, show that Foxes were actually present in the Kentish suburbs of London in surprising numbers. In 1947 181 were shot, 103 were killed in 1948 and 129 in 1949.

Over the period 1950 to 1956 Fitter (1960) received records for the suburban localities of Kenwood, Middlesex, and for Bromley, Bexley Heath and Chislehurst in Kent, while his successor as Recorder of Mammals, Mrs. R. E. Parslow, was notified of a Fox at Epsom Sewage Farm

**Lepus europaeus* Pallas, 1778 is considered to be conspecific with *L. capensis* Linnaeus, 1758. See Corbet (1964).

in December, 1954 and of Foxes in the Ruislip district of Middlesex in the early 1950s. R. G. Rigden saw an animal's tracks in the snow in Regent's Park on February 21, 1956, which he felt confident were those of a Fox (Fitter, 1960). They formed a straight line across Chester Road, near its junction with the Inner Circle. The animal could, of course, have been a wanderer from Hampstead.

The fact that there is little *in the Society's records* for the early 1950s to suggest any large scale infiltration of the suburbs or an expansion of the existing Fox population would appear to be due to the members' lack of interest in mammals at this time rather than to a lack of Foxes. The only hint that something was happening (in Kent) came from D. M. Edwards in July 1952, when he remarked that the Head Keeper of Chislehurst Common had accounted for 94 Foxes since coming to the neighbourhood and that seventeen were shot during one drive in Scadbury Park in 1951. M.A.F.F.'s figures for the Kentish London suburbs afford additional evidence that the Fox was present in strength. Total numbers of animals shot in this sector for the first half of the decade were: 196 in 1950 (with 23 killed in one drive in Scadbury Park), 168 in 1951, 145 in 1952, 171 in 1953 and 157 in 1954. No figure is available for 1955.

A slight increase in the number of Fox records received by the L.N.H.S. for the years 1957 and 1958 must almost certainly be the result of the revival of British mammalogy which has been fostered by the Mammal Society. This body, founded in 1954, encouraged a number of L.N.H.S. members to take up the study of mammals with a new enthusiasm. Another factor which drew attention to the Fox in the 1950s was the sudden decline in the population of the Rabbit *Oryctolagus cuniculus* due to the virus disease myxomatosis.

PRESENT DISTRIBUTION

Fox records received from members of the L.N.H.S. and from other naturalists over the years 1959 to 1965, and from M.A.F.F., mainly for the years 1959 and 1960, were plotted on a map of the Society's Area whenever the precise locality was known. The appropriate 1 km. National Grid square was shaded in for each locality, the method employed by Beven (1957) when illustrating the distribution of the Grey Squirrel *Sciurus carolinensis* in the London Area.

Fig. 1 is adapted from the original map, and shows where Foxes were recorded within the built-up area and along its margins. Thanks to the help given by M.A.F.F. it is less of a distribution map of Fox observers than it might otherwise have been. Nevertheless, good coverage in a particular area is often due to the energy and enthusiasm of dedicated mammalogists. The detailed information we have for the Esher/Molesey district is mainly due to the efforts of P. A. Morris and Dr. D. W. Yalden. Lewisham Natural History Society helped to augment the numbers of records for Kent, and field work carried out by a few members of our own Society's Young Naturalists' Section (unhappily no longer in existence) helped to fill gaps in the Surrey sector.

There was a poor response from members living in Essex; Foxes were recorded from only seventeen 1 km. grid squares. Fortunately M.A.F.F. officers were able to help, and could show that Foxes have occurred generally throughout the Essex suburbs and as near to the centre of London as Walthamstow, Leyton, Wanstead, Ilford and Barking. It was not possible, however, to obtain detailed, dated information.

In Kent Foxes are numerous at Beckenham, Bromley, Orpington, Chislehurst, Eltham, Sidcup, Bexley and Dartford, and have penetrated north-eastwards as far as Woolwich Arsenal, Charlton, Blackheath and Greenwich Park. Rumours circulating in December 1961 of a Fox living in Greenwich Park, less than six miles from St. Paul's Cathedral, were not taken seriously until, on the 23rd, seven people claimed that they had seen it. P. C. Tinning, then the Official Bird Observer for the Park, had a close view of the animal (or another) in the Wilderness in April 1962, and the deaths of a number of wild Mallard *Anas platyrhynchos* during the nesting season were attributed to this predator (Ministry of Public Building and Works, 1964). A Fox was seen in the Park again in January 1963, and three were shot there between January and May 1965.

In Surrey the Fox is an obvious and much publicised resident of the Boroughs of Croydon and Epsom and Ewell, many islands of "undeveloped" land and thousands of large gardens providing it with many suitable breeding sites. That no records have been received from the Surbiton, Kingston-upon-Thames and Merton districts, which would seem to be equally suitable, is more likely to have been due to a failure in the mammal reporting organisation than an absence of Foxes. The Esher, Walton-on-Thames and Weybridge area has a good population, but this is hardly surprising considering the semi-rural tongues of land which push through the suburbs here along the valley of the River Mole and in the neighbourhood of Chessington. Innermost Surrey localities where Foxes have been seen in recent years, and where they could become well established, to judge from developments in Greenwich and Blackheath, are Streatham and Dulwich. A Fox was trapped alive by the R.S.P.C.A. on October 9, 1960, even nearer the centre of London, in South Lambeth Road (*The Times*, 10.x.60).

In the vice-county of Middlesex most reports are for the Hertfordshire border and the Hampstead, Highgate and Finchley areas. The northern limits of fairly solid suburbia run close to the Hertfordshire-Middlesex boundary, and Foxes have easy access to and from farmland. There is also a curious green enclave between Barnet and Hendon, with the vulpine settlement of Mill Hill more or less in the middle of it. A narrow strip of built-up land separates this semi rural intrusion from the broken chain of parks, cemeteries, golf courses, playing fields and hospital grounds of Finchley, Highgate and Hampstead. In this area Hampstead Heath (with Parliament Hill and Kenwood) may be regarded as the classic locality of the London suburban Fox.

One can be fairly certain that, with a good Fox population at Mill Hill, some colonisation of the Colindale district must have taken place, but confirmation is needed. Foxes have bred at Kingsbury, a little further south, and late in 1959 the *Willesden Chronicle* published a photograph of a Fox killed on the road in Neasden. South-west of this area collected data suggest, perhaps falsely, a patchy distribution. There are records for Harrow, Perivale, Northolt, Osterley Park, London Airport, Bedfont,

Hounslow, Feltham and Ashford. There are large expanses of open land here, especially between Ruislip and Hillingdon, and between Harlington and East Bedfont, some of it market garden, some of it airfield, and much of it a subtopian landscape belonging neither to town nor country. It almost certainly harbours more Foxes than records at present suggest.



FIG. 1. Recorded distribution of the Fox in London's built-up area, 1959-65.

Penetration into the inner suburbs to the south of Hampstead and to the east of the River Brent seems unlikely to result in successful colonisation. Poultry were raided at Park Royal in 1963 (the precise locality is not known and is therefore shown on the map by a question-mark), and in September 1962 a Fox was seen in car headlights on the Bath Road at Bedford Park. Inner London records include one for Primrose Hill Road and one for Hyde Park. The latter was the subject of a letter to *The Field* (9.i.64) from a reader who had "recently" seen it in the headlights of his car. The Ministry of Public Building and Works learned that this Fox had been seen on several occasions by the police in the Park, and that it was finally found dead on the grass verge of the North Carriage Road on December 23, 1963, having apparently been run over.

RELATIONSHIP WITH MAN (AND DOGS)

Few people who come in contact with Foxes can remain indifferent to them. In the London Area the animals have their friends and admirers who feed and protect them, often in secrecy, but they also have their enemies, some of whom, having lost poultry or pets, have good reason to feel bitter. Counter-action has sometimes been unofficial and irresponsible, and in February 1960 *The Kentish Mercury* carried a story of a group of Fox shooters operating in the south-east London, one of whom admitted that their "great sport" also included the destruction of owls and "kestrel hawks". In 1962 the grounds of a hospital in the Kentish sector were the scene of a barbarous incident, reported in the national Press, of a vixen and cubs killed with ignited paraffin.

Foxes are frequently the subject of letters to the newspapers. Some, likely to be published under the heading of *Rus in urbe*, may recount the thrill of having seen a beautiful wild creature in an unexpected setting, while local papers might print correspondence complaining of wholesale damage and the apparent inability of anyone in (local) authority to deal with the problem. Foxes have sometimes caused argument and strife between neighbours who cannot agree on a policy of human-vulpine co-existence, and disputes have arisen which have concerned the R.S.P.C.A. and the police.

It is because of the sociological element involved that in some sections of this paper it is not always possible to mention the location of the occurrences described, and why the names of the many vulpophiles and vulpophobes are always not disclosed. Those who enjoy seeing their local Foxes in the garden wish to continue to do so, and often do not even share their secret pleasure with their next-door neighbours lest they should see things in a different light.

Complaints are investigated by Field Officers of M.A.F.F. Periodic drives and shoots are conducted at a number of Fox-infested places, for example—in the Kentish sector—Beckenham Place Park, waste ground near Kelsey Park, Beckenham, similar ground at Bickley, and Scadbury Park, Chislehurst. The animals are often flushed only with difficulty, preferring to lie low in cover until the beaters are within a few feet of them. Earths are gassed.

One thing seems fairly predictable; other Foxes appear and replace the deceased. The driven areas are reoccupied and the earths re-used. In the spring of 1960 an earth which was gassed successfully in Highgate Old Cemetery, Middlesex, was occupied by another vixen within three weeks. At another earth in a garden in Wallington, Surrey, gassed three times in 1960, one of the successive vixens involved brought out the bodies of the last ill-fated family before giving birth to her own.

Unofficial action probably accounts for a good many. At a rubbish tip at Pratt's Bottom, Kent, strictly speaking outside the true suburbs, but within very easy foraging range of Orpington, a local man shot 45 Foxes between Christmas 1961 and the end of May 1962.

In spite of what must be a fairly heavy annual toll, the numbers of Foxes in the London Area do not seem to decrease, and in fact may be still increasing.

A number of people feed Foxes in their suburban gardens. This has sometimes started by accident, the kitchen scraps or ham bone having been put out for the birds in the first place. The benefactor, however, having recovered from his or her astonishment at seeing a wild Fox on the lawn by the bird table, has repeated the performance, with the result that the Fox, or as is often the case, Foxes, have become regular visitors. Such sights have been noted even within six miles of St. Paul's Cathedral, and one Surrey hostess has entertained as many as six Foxes at once! One correspondent who kept fantail pigeons (and lost a few!) found that "her" vixen's arrival for meals coincided with the time her pigeons were given their food. A Fox at New Eltham, Kent, has come to within a few feet of an observer, to collect the food provided for it every night.

To judge from the records, many Foxes took to feeding in back gardens during the severe winter of 1962-1963, but there is a 1961 note of a Fox taking bread from a bird table in a garden near Esher Common.

Whereas relatively few suburbanites feed their local Foxes deliberately, there are many who do so unintentionally, for edible items on the compost heap and food refuse in the dustbin are readily acceptable to Foxes. The visits are usually made at night, and residents may be roused from sleep by the noisy removal of dustbin lids. Hampstead Foxes were known to be raiding dustbins in 1945 (Lancum, 1947), and the habit has persisted there. In 1960 they were reported to be raiding dustbins at East Finchley and at Bethlem Royal Hospital, Beckenham, while at Croydon a Fox was watched feeding from a swill bucket.

E. Venis, reporting in September, 1963 on the Foxes in the Hatch End and Headstone Lane district of north-west Middlesex, recalled seeing tracks in the snow leading to dustbins during the severe weather at the beginning of that year, and on several occasions saw a Fox cross the fence from his garden to the next. Dustbin visiting was certainly a well-established habit in this district by September 1963, and one of Mr. Venis's informants, was of the opinion that it had really started during the cold spell. He claimed to have once seen as many as twelve scavenging Foxes together. A number of other residents in the neighbourhood remarked on the ease with which Foxes scaled walls, fences and sheds as they went from garden to garden and from bin to bin.

R. A. Lever (*in litt.*) confirms that dustbins are an attraction in country areas as well as in town. There are certainly reports from the more rural parts of the Society's Area; N. Dorset found cases of this type of scavenging around Redhill, Surrey in 1959 and 1960, as did B. S. Meadows at

Broxbourne, Hertfordshire in June and July 1964. Christian (1963) and Vesey-Fitzgerald (1965) both mention the habit.

Although an article which appeared in the *Edgware Times* (23.ix.60) suggested that a dog in the garden was a good Fox deterrent, there is a good deal of evidence to show that the presence of dogs often makes very little difference. M.A.F.F.'s Field Officers in Kent in fact commented in 1960 that the Foxes that lurked in the brambles near Kelsey Park were ignored by the numerous dogs which were exercised within yards of them, and the Foxes in turn ignored the dogs. In some places dogs and Foxes have actually fraternised. Vesey-Fitzgerald (1965) refers to cases of dogs playing with Fox cubs, and the writer of a letter published in the *Daily Express* (12.x.61) had watched the playful antics of a large Labrador and a wild Fox cub in a garden in Kingsbury. There appear to be few instances of adult Foxes playing with dogs in the wild. Hurrell (1962) mentions a case of one which played with a terrier in a field, but the only comparable observation for the London Area which has been brought to my notice was made by K. H. Hyatt at Kenley, Surrey in 1964. He watched "a large collie of sorts" and a full-grown Fox engaged in what appeared to be a chasing game, completing two circuits of a back garden and running round the side of a house. Neither animal was going very fast, and they appeared to be "enjoying themselves".

Many people have watched cubs playing amongst themselves on their lawns, and in one garden, with a ball which had been provided for them. At South Croydon cubs were seen bathing in a garden pond.

Although many householders seem prepared to have Foxes feeding, playing and even breeding in their gardens, few are likely to take kindly to Foxes indoors. The *Coulsdon and Purley Times* (29.ix.61) reported a case of a Selsdon resident who found a Fox looking at her from behind the settee, and in the *Evening Standard* (5.ii.65) there appeared the story of a Fox seen entering a house in Greyhound Lane, Streatham. During the freezing February of 1963 a local authority received a cryptic anonymous note written in capital letters which began, "FOR YOUR INFORMATION" and went on to say, "FOX HAS ITS LAIR IN HOUSE (in such-and-such a road)—EASY TO TRACE IN SNOW—FOOTPRINTS OF CREATURES".

Mention might also be made of a number of incidents which, while of even less ecological significance, are worth including if only for their amusement value: the Fox that in daylight stole a chicken from a delivery van near Beckenham Place Park; the Fox that jumped off the top of an electricity transformer at West Wickham, Kent, after someone had mistaken it for a large ginger cat and had gone to stroke it; and the young Fox which ran off with the golf ball on the fourth green at a golf course in S.E.21. B. P. Pickess (pers. comm.) found that Foxes frequenting Ruislip Local Nature Reserve would collect golf balls which came over the fence from the adjoining Haste Hill Golf Course. Caches of as many as eight were often found, all severely chewed.

The most extraordinary story of all, however, predates the start of this enquiry, but was brought to my notice in 1960. It concerns a vixen which, in 1958, successfully reared a family of cubs on a South London bombed site, with the help of local residents and the late Inspector Rogers of the R.S.P.C.A. The site was by Eastcote Street, S.W.9, near the junction of Clapham Road and Stockwell Road, and only a matter of yards

from Stockwell underground station. It is perhaps of some interest that this locality is not very far from the spot in South Lambeth Road where a Fox (mentioned on an earlier page) was trapped alive two years later.

BREEDING

An earth, as stated by Millais (1904), may be dug by the Fox itself if the digging is easy, it may be an enlarged Rabbit burrow, part of a Badger sett, unoccupied or occupied, or "any dry hole in a tree-bottom, wall or among rocks". As Vesey-Fitzgerald points out, however, many Foxes do not use holes at all, and the cubs may be born above ground in scrub.

While the cubs are growing the vixen may move them several times, from one hole to another, or to the density of bushes, a wood-pile or some other hiding-place. This may be the result of disturbance, often only slight disturbance (Southern, 1964), or, as Millais (1904) suggests, so that the cubs may be brought nearer the vixen's hunting grounds. A. M. Hutson noted a good deal of movement from earth to earth at Beddington Sewage Farm, Surrey, in 1960.

Many earths and surface dwellings in the London suburbs would be regarded as "normal" by the standards of most general books on natural history. Even Fox-occupied Badger setts are known from outer suburban Surrey. Other London breeding sites, however, if only because of their situation, might be regarded as out of the ordinary, or at any rate they might have been fifteen years ago.

"Heavy" vixens make frequent use of back gardens, and garden earths have been recorded from several localities on both sides of the Thames, in Middlesex, at Northwood in 1959, on ground made up for a tennis court, and in various residential parts of Hampstead and Highgate, with one earth under a garden shed in Highgate in 1961; in Surrey, at Wallington in 1960, under an old concrete air raid shelter at Ewell in 1964, and in another air raid shelter in Sanderstead in 1960; and in Kent, regularly in several gardens in Bromley and Bickley, in a Blackheath garden in 1963 and 1964, and in a garden conservatory at Chislehurst Common in 1960.

It will be noted that vixens readily resort to the shelter of out-buildings, and there seems to be a tendency to do this throughout the suburbs. In 1960 a litter was born in an overgrown bank behind derelict huts on Hounslow Heath, Middlesex. The *Middlesex Chronicle* (28.vii.61) reported the shooting of two of a family of four Foxes "in an old well in property adjoining the High Street", Cranford. A third and even more remarkable Middlesex record for which I have M.A.F.F. to thank, was of a vixen with eight cubs found in 1960 under a shed on a building site in East Finchley. The place was a hive of activity, with contractors' lorries and other heavy vehicles noisily moving all around. The remains of eighteen hens were found under the shed, one of them bearing the label of a local butcher. The vixen had evidently been helping herself from his dustbin. In the same year another vixen and cubs were found living under a tool shed by a bowling green adjoining Sundridge Park, Kent. They had been feeding on the dried blood that was spread on the green as a fertiliser.

Many vixens find security on industrial sites. Middlesex pest officers regularly visit the grounds of a gas works in the north of London, and have two problem locations elsewhere in the vice-county. One is a scrap merchant's yard where the Foxes live and breed amongst the accumulation of old iron. The other is a stone works, where the animals live securely amongst blocks of masonry weighing several tons apiece. Here it is impossible to use dogs or gas.

Sewage farms are also tenanted. It would be expected that Foxes might inhabit the outlying farms like those of Perry Oaks, Middlesex, and Romford, Essex, but they also occur and breed further in at the sewage farms of Beddington, Epsom and Elmers End, south of the Thames. M. J. Carter, reporting on Epsom Sewage Farm in 1960, said cubs had been born in most years since the outbreak of myxomatosis in the London Area.

Cemeteries too are the home of Foxes, especially in Middlesex and breeding has occurred at East Finchley (St. Marylebone, and St. Pancras and Islington Cemeteries), Hendon Park and Highgate. Bandonhill Cemetery at Wallington, and Crystal Palace District Cemetery, Beckenham, are examples of this habitat south of the river.

Railway embankments, noted sanctuaries for many species of plants, also provide well-drained sites for Fox earths. Foxes make use of them on the Essex, Middlesex, Surrey and Kentish rail routes into London, but especially on the Kentish approaches. From some embankments single Foxes and sometimes family groups regularly watch the early morning commuters on their way to town. Some passengers make a point of looking out for the animals daily, and on at least two occasions in recent years photographs of trackside Foxes have been taken for the Press. The story I heard that one train driver would actually slow down to give passengers a longer glimpse would doubtless be firmly denied in official quarters!

Most observers have mentioned three to four cubs if they have noted any numbers at all. Various estimates of the average litter size of the Fox have been given in the literature: "usually five to six" (Lancum, 1951), "rather under $5\frac{1}{2}$ " (Matthews, 1952) and 4.7 (Southern, 1964, quoting Tembrock, 1957). Four to seven seems to be accepted as normal (Millais, 1904, Rode and Didier, 1946, Vesey-Fitzgerald, 1965), but family size may be related to food supply. Hurrell (1962) says five or six are frequent. Vesey-Fitzgerald (*op. cit.*) states that as many as nine, and as few as one, have been recorded. Lancum (1951) quotes a case of ten cubs taken from an earth in South Devon and nine from another. In the first instance it was suggested that the "litter" might have been produced by two vixens, but no such doubts were raised about the nine.

The litter of eight on the East Finchley building site therefore seems to be on the large side if indeed the cubs were all of one family.

FOOD

It may be believed in some quarters that, now the numbers of Rabbits have been greatly reduced, the Fox depends mainly for its livelihood on what long-suffering farmers and game-preservers unwillingly provide for

it. Rabbits were certainly an important prey item before myxomatosis took its toll, mainly (in southern England) during 1954. Southern and Watson (1941) showed that in spring and summer Rabbits accounted for some 55 per cent of the Fox's diet. In the case of lowland Foxes the percentage was 68. Hurrell (1962) mentions his analysis of 50 Dartmoor Fox droppings collected throughout 1945, in which he found that Rabbit remains amounted to 60 per cent of the total volume.

With the disappearance of the Rabbit it was expected that there would be a great increase in the amount of damage caused by Foxes, just as land-owners pessimistically anticipated that the Buzzard *Buteo buteo* would be taking more poultry and game (Moore, 1957). Fox shoots operated in many districts, and one result was that a good deal of material became available for much needed research.

Lever (1959) examined the stomachs of 385 adult Foxes and 35 cubs, and dissected 123 droppings. A large number of stomachs (55) were from Foxes obtained between March 1955 and November 1957 at Chevening Park, Kent, in the rural part of the L.N.H.S. Area. When comparing his analysis with that of the material collected in the period 1939 to 1940 by Southern and Watson (the contents of 40 stomachs and eighteen faecal pellets), Lever found a drop in the percentage occurrence of lagomorphs (mostly Rabbits) as prey of lowland Foxes, from 68 to 24.5. That of poultry and game birds rose from 12 to 27.5, and that of other birds from 28 to 35.5. The really significant change, however, was in the percentage of voles (mainly Short-tailed (Field) Voles *Microtus agrestis*) which rose dramatically from 4 to 41.5. In hill country (well beyond the London Area) the changes in the percentages of lagomorphs and birds (all kinds) showed the same trends, although they were less marked. The incidence of voles, however, increased from 15.4 to 51.5 per cent.

It was clear that when the Rabbit became a rarity, the Short-tailed Vole became a very important prey item. Lever found that Bank Voles *Clethrionomys glareolus* and Wood Mice *Apodemus sylvaticus* were also taken, but in much smaller quantities. They were considered difficult to catch. The Common (Brown) Rat *Rattus norvegicus* was the second commonest rodent recorded. It was an insignificant item on the pre-myxomatosis list of prey species.

Unfortunately no detailed information of this order is available on the diet of Foxes in the London suburbs, and without a systematic examination of stomachs and droppings it would be impossible to tell whether it differs markedly from that of the rural animals. Foxes living on the outer suburban fringe would enjoy the best of both worlds, exploring the fields and coverts as well as the streets and back-gardens. One would not expect *their* food to be significantly different from that of Foxes in lowland areas generally. Rodents, gallinaceous birds and suitable invertebrate prey (beetles, earthworms, etc.) are available, and the Rabbit population has shown signs of recovery in several areas. These Foxes would also scavenge. Lever showed this to be a habit even of country Foxes. They visited garbage dumps and Service camps to do this, as well as to catch young rats.

Further into London one would expect more scavenging and less predation. The range of live animal food would become restricted. Rats would be of considerable importance as a food item in many places.

Collenette (1937) attributed the scarcity of rats in Richmond Park to the work of Foxes, contrasting the situation there with that in Kew Gardens and in the Terrace Gardens at Richmond, where rats were frequently seen, even by day. In 1960 the Ministry's pest officer found dead rats strewn around the entrances to an earth in St. Pancras Cemetery at East Finchley. In 1963 the residents of one Surrey suburban road claimed that the arrival of "their" Foxes coincided with the very severe reduction of the local rat population.

Our present knowledge of the distribution of small rodents in the middle or inner suburbs, summarised in reports on the mammals of the Society's Area in earlier numbers of the *London Naturalist* (Fitter, 1949 and 1950, Rigden, 1954, Teagle, 1963, 1964 and 1965, and Burton, 1966) is admittedly incomplete, but it is quite evident that their range must be discontinuous. Large areas of built-up land are totally unsuitable for voles and Wood Mice, even where large gardens are associated with the buildings, and the total acreage of ideal habitat is continually shrinking.

Rabbits occur within the middle suburban belt at Hampstead Heath, where they escaped myxomatosis (Taylor, 1962), Wimbledon Common, Richmond Park, Ham Common, Mitcham Common, Beddington Sewage Farm, and in the Eltham woodlands. A Central London population, the origins of which must be attributed to human eccentricity, exists in Kensington Gardens, without official blessing or encouragement.

It would be impossible to say without exhaustive research to what extent the potential mammalian prey is exploited in the London suburbs. I did find part of the mandible of a Bank Vole in a dropping from Bexley Park Wood, Kent, in August, 1961, and a dropping found in Kew Gardens and sent to me by Miss Evelyn Brown in March 1961, contained hair and fragmented bones of Rabbit.

There have been several newspaper reports of Foxes killing cats for food, and in a pet-owning society it would only be necessary to publicise an occasional case of felicide to create a minor scare. A Surrey newspaper stated in February 1960 that there were "stories" of several cats in one residential neighbourhood having been killed by Foxes, admitting later in the same article that an animal welfare society official had received but *two* cat pelts and that he only *suspected* that Foxes had been responsible for the deaths of these animals. The very severe winter weather of early 1963 produced a crop of sensational stories in the local and national Press. One began, "Hunger crazed foxes hunting in packs are killing household pets in two Surrey villages", preparing the reader for a lurid picture of wholesale carnage but doing little in the succeeding paragraphs to substantiate the opening remarks.

Vesey-Fitzgerald (1965) considers it unlikely that any cats other than the very old or the very young would be likely to be killed by Foxes, but M.A.F.F. officials were able to confirm in 1960 that some cat-killing was taking place in the Kentish sector, and at West Wickham they found the tails of seven victims under a shed. Lancum (1951) was unable to find any conclusive evidence of cats having actually been eaten, but knew of two cases of a cat being pursued and killed. Lever (1959), when working on prey analysis, recorded the remains of a cat once, but this animal could, of course, have been found dead. Cats are often killed on the roads.

There was undoubtedly good cause for alarm amongst pet-owners during the 1963 winter, but under normal circumstances it would seem

that the killing of adult cats can be regarded as exceptional behaviour. As Vesey-Fitzgerald points out, a full-grown, healthy alert cat could be a formidable opponent for a Fox. In 1961 at Kingsbury, a stray cat was seen to take a bone away from a Fox, which "ran for its life". J. Graham Harvey saw a cat pursuing a Fox in South Croydon in 1964.

Although Lancum (1951) considered that Foxes had an antipathy towards cats, this does not appear to be always the case. A reliable Society member knew of a cat which in 1963 not only went about its normal business unmolested by the Foxes with which it shared the street, back gardens and a builder's yard, but was on several occasions seen playing with the cubs! This was in the Surrey borough from which vulpine mob-violence against cats had been reported earlier in the same year. Other cases of friendly associations between Fox and cat have been noted elsewhere. *The Field* (17.vi.65) published a letter from a reader in Cheshire who saw a Fox and a cat "trotting side by side", and two weeks later a letter appeared in the same journal from a Buckinghamshire reader whose cat had often been watched playing with a dog Fox and vixen.

Although the status of the Fox as a predator on the domestic cat may have been exaggerated, no-one could possibly deny that Londoners lose poultry to these animals. There are naturally more reports of fowl-killing from the outer suburbs, but backyard chickens are still kept in the inner areas. The Fox that in 1960 was trapped in South Lambeth Road had killed ten Inner London chickens.

Raids are also made on parks where pinioned ornamental waterfowl are kept or where wild Mallard occur. This is not a new development. Fitter (1949) referred to the Fox living in Kensington Gardens attacking "swans, geese, ducks and pigeons" and one that killed a goose in Greenwich Park in 1947. Foxes have helped themselves to ducks in Golder's Hill Park, adjoining Hampstead Heath, and during the cold spell of January 1963 they took ornamental birds from Waterlow Park, to the east of the Heath. The Fox that frequented Greenwich Park in 1961 and 1962 although ignoring the Park Superintendent's chickens, killed several Mallard for food.

Feathers and bird bones in Fox droppings do not always indicate bird-killing. As has already been mentioned, the Fox is a carrion-eater, and this propensity was responsible for at least 1,300 known Fox deaths in Britain between the autumn of 1959 and the spring of 1960. The Foxes had eaten birds, especially pigeons, which had been poisoned by feeding on grain treated with the organochlorine compound dieldrin to combat the Wheat Bulb-fly *Hylemyia coarctata*. The true causes of death were not made generally known until the facts were published by Taylor and Blackmore (1961), and various theories were put forward in the interim period, as described by Coleman-Cooke (1965). The "disease", of course, mainly affected Foxes in agricultural areas, particularly the intensively farmed acres of East Anglia, but two cases of suffering animals on the outskirts of London were brought to my notice by Norman Wilkie, a P.D.S.A. Superintendent, one from Kent, the other from Essex. On January 14, 1960, he caught a Fox in a suburban garden in Abbey Wood, S.E.2. The animal offered no resistance, was partially blind, and on examination at the clinic was found to have a slightly elevated temperature. It died overnight and the case was thought to have been one of canine hepatitis. The second animal, living in a semi-rural rather than a

suburban environment, was caught in the garden of a house near the refreshment room by Hainault Forest Golf Course. It too was submissive, almost blind, and had a raised temperature, but it was also suffering from fits.

F. J. Speakman also had experience of odd Fox behaviour and strange deaths in Epping Forest early in 1960, and there must have been numerous other cases in the rural parts of the Society's Area of Foxes being poisoned by seed dressings. The map published by Taylor and Blackmore (1961) shows most of Essex, half of Hertfordshire and the extreme north of Middlesex as being included in the area most seriously affected.

Birds, other than poultry, undoubtedly form part of the diet of the suburban Fox, but we have no sure means of determining the proportion or the species involved. Identification of bird remains is difficult, often impossible. Foxes avoid eating large primary and secondary feathers, and the quill bases found in droppings are useless for identification purposes (Lever, 1959). The vanes of smaller feathers are normally destroyed by the digestive processes. I have, however, found clearly recognisable hackle feathers of Starling *Sturnus vulgaris* in Fox droppings collected in Dorset. Uneaten remains of avian prey can sometimes be found. G. H. Gush discovered the remnants of Moorhen *Gallinula chloropus*, Woodpigeon *Columba palumbus* and Blackbird *Turdus merula* at an earth in March 1964, but this was in a rural locality, at Chertsey, Surrey.

Vegetable matter is taken, some of it incidentally, but much of it deliberately. At Esher Dr. Beven found three plum stones in one Fox dropping, and has also found the remains of Rowan *Sorbus aucuparia* berries. There were many of these trees in neighbouring gardens.

Reference has already been made to scavenging. Even before dustbins were noticed to be an attraction, Collenette (1937) had found a Fox investigating wastepaper baskets in Richmond Park. A strange assortment of objects may be taken, some of which would appear to have little nutrient value. Dr. Beven recovered a much coiled piece of thick string from an Esher dropping, and Lever (1959) found the remains of "potato skins, straw, rotten wood, twigs, wood shavings, cinders, writing paper, newspaper, silver paper, string, a rubber band, cotton wool, pieces of cotton cloth, steamed bone (fertiliser), paraffin wax, bacon rind, and fat or lard".

Receptacles for waste, whether in public open spaces or suburban gardens, must, however, provide the Fox with a great variety of more wholesome stuff. As Lever (*op. cit.*) remarked, the animal has "a very catholic taste and takes whatever food is readily available". Sometimes the pickings are rich indeed. One correspondent was informed by his butcher that the local residents bought the largest pieces of beef, ate the best bits, and consigned the rest, "a substantial amount", to the dustbin—and the Foxes.

DISCUSSION

The naturalist regards with continuous dismay the ecological changes caused by urban development. It is true that less adaptable forms of life will disappear as the builder advances, but it is now well known that some

species can survive and actually flourish in what might at first appear to be inhospitable terrain. The Fox has benefited by the spread of suburbia.

Urban growth interfered with the activities of the Hunt even in the last century. Forbes (1911) quotes Brooksby's description (in *Hunting Counties of England*) of the difficulties experienced by the Old Berkeley Hunt which were caused by the crowds of "non-descripts" who issued forth from "every suburb of London" whenever a meet was advertised. These unwelcome spectators, accepting the occasion as an excuse for a holiday, eventually made it impossible for the Old Berkeley to continue hunting in Middlesex.

In later years the network of electric railways radiating from the capital placed further restrictions on the hunting fraternity. The Foxes, however, found them an advantage. Whilst they, like Badgers and other mammals, are sometimes electrocuted on the live rails, the sides of the permanent way provide easy routes into the built-up area and can make it possible for a Fox to penetrate the very centre of London. The cuttings and embankments provide sites for breeding earths, and the vegetation which clothes these banks would probably support animal life which would include prey species such as invertebrates and small rodents. Rabbits certainly occur on many suburban embankments in Kent and Surrey. As far as I am aware, the zoological potentialities of London's railway embankments have yet to be properly investigated, although items of botanical interest have been noted (Fitter, 1945).

I have no evidence as yet that canal towpaths are used as Fox highways, but it seems likely that they are. The Foxes certainly have no aversion to using the roads, as the numerous records of animals seen in car headlights and even in daylight show. An Alderman of the Borough of Epsom and Ewell, Surrey, complained that Foxes crossed The Avenue, Worcester Park in broad daylight, and that one had been caught in the shopping centre in Central Road (*Evening Standard*, 7.v.62). One was seen one morning in 1962 by Mrs. L. G. Pine, crossing through the traffic on a Purley thoroughfare appropriately named Foxley Road. F. C. Reeves reported a Fox in the road at The Spaniards, Hampstead Heath on January 9, 1963, holding up the London-bound traffic.

A good deal of movement must take place at night. Dr. Beven (*in litt.*) found a Fox dropping at Esher on his car drive, almost on the road, and walking along several neighbouring roads in the very early hours of a June morning, came across the strong smell of Fox at several places. Another observer has often watched local Foxes late at night going down his road towards its junction with the Brighton Road, and one night saw one of them turn back three times to discourage two cubs from following it on its nocturnal ramble.

Some Foxes are, of course, killed by motor traffic, but the species is no doubt capable of adjusting its life to the hazards of traffic just as the Coyote *Canis latrans* has in the automobile dominated city of Los Angeles. To quote Froman (1961), "When the eight-lane freeways . . . first were opened, a few coyotes were killed by the fast traffic. The others quickly grasped the danger, but this did not mean giving up the freeways . . . The coyotes simply stay away from them except during the early morning hours when traffic is light. At such times they may be seen trotting along the edges or down the center mall".

Man's lines of communication suit the Fox well. If penetration into the inner core of London is relatively simple, how much easier it must be

to move into our smaller towns and cities; into Plymouth, where the Corporation invited the Fowey Hounds to deal with the Foxes in Central Park, after they had killed geese and ducks in the zoo (*The Times*, 22.i.66); into the Henleaze suburb of Bristol, where the familiar "escaped pet" theory is advanced (*Bristol Evening Post*, 31.i.66); into Dudley, Worcestershire (Vesey-Fitzgerald, 1965), the suburbs of the Medway towns (G. H. Pattinson, *in litt.*), Eastbourne and Bexhill-on-Sea (Christian, 1963), Southampton and Bournemouth. G. H. Pattinson (*in litt.*) states that a number of hunts in Kent have difficulty in locating Foxes in their usual coverts, finding them instead much nearer built-up areas. Christian (1963) considers that "there are sometimes more foxes dwelling within three or four miles of the local Woolworth's than in the deep countryside", and in my new home town of Swanage, Dorset, Foxes have been seen in the main streets, once in the doorway of a large café on the sea-front and on another occasion on the doorstep of the National Provincial Bank.

The Foxes that have found their way into London have many things in their favour. The environment has proved to be as propitious for them as it has for the Grey Squirrels. They are safe from the Hunt, and they benefit from the fact that there is a multiplicity of property owners; each of these must be approached for permission before any drive or gassing operation can be carried out. There is plenty of cover. Although some suburban parks may be too tidy and orderly for the Foxes to find refuge, there are many public open spaces of the wilder kind where the vegetation suffers relatively little interference. There are numerous sheds, shacks, drains, banks, scrap yards and dumps where cubs may be reared. There are gardens which provide shelter and where food is freely given.

The diet of suburban Foxes deserves further study. We know that the animal will accept a wide variety of foods, and is able to make adjustments, so that it can survive even a dramatic decline in the population of an important prey species like the Rabbit. The small mammals which are available to the country Fox are not as plentiful in the suburbs. This has been demonstrated by the study of the diet of Tawny Owls *Strix aluco* carried out by Beven (1965), but the suburban owls are able to capture with ease avian prey species which, although acceptable to the terrestrial Fox, would often, like the grapes in the Aesop fable, be out of its reach. An investigation of the diet of suburban Foxes on the lines of the enquiries carried out by Southern and Watson (1941) and Lever (1959) should show to what extent these animals are dependent on the hand-outs and edible rejectamenta of Suburban Man, and would provide an interesting comparison with the food of country Foxes.

The colonisation of the suburbs by Foxes would seem to be a new development. How has it been achieved? Foxes were apparently not always common mammals, even of the countryside. At one time they were imported for the chase from various European countries, and in large numbers (Millais, 1904 and *The Times*, 8.iii.52). Are London's Foxes the progeny of those which might have been left behind in patches of parkland and woodland which became isolated as the tide of bricks and mortar flooded the green fields? Or are they invaders and the descendants of invaders from the rural areas?

I consider that invasion has probably played a much more important part than the isolation of populations which already existed. It could have been a process comparable with the colonisation of Central London

by the Moorhen in the 19th century (Hudson, 1898) and the Jay *Garrulus glandarius* in our own century (Cramp and Teagle, 1952).

It is by no means certain what could have initiated the movement into the suburbs. G. Taylor (*in litt.*) points out that Foxes began to be noticed regularly at Hampstead Heath in the 1930s, when rural Middlesex was fast being consumed by building development. The Foxes "in the large rural area to the north of the Heath were obliged to move either north or south. A sufficient number of them evidently moved south to attract notice . . ."

The more general invasion seems to have started much later. Hard weather may have had an influence. The severe winter of 1962-1963 certainly affected the *behaviour* of Foxes, as has already been described, and they became more *obvious*. That does not mean that they became more *numerous*, that more Foxes moved into suburbia to join those already there. Unfortunately there does not seem to be anything in the Society's records to show what Foxes did in the bad winter of 1947.

Another possible factor which comes to mind is myxomatosis. Could the virtual disappearance of the Rabbit have driven *some* Foxes into the suburbs in search of alternative food? The spread of myxomatosis is described by Thompson and Worden (1956). It reached Sevenoaks, Kent, within a mile of the boundary of the Society's Area by November 20, 1953, but was not recorded within the Area before April, 1954 (Fitter, 1960). From the figures quoted by D. M. Edwards and by M.A.F.F. (given on pp. 49 and 50), however, it seems that Foxes were already quite numerous in the Kentish suburbs of London years before myxomatosis came to Britain. It has not been possible to establish whether the position was the same in other parts of the London Area.

Now this intelligent and highly adaptable animal has a firm foothold in the London suburbs, and appears to be flourishing despite the efforts made to control it. In fact control measures over the country as a whole seem to have relatively little effect on the status of the Fox. Hunting and shooting probably accounts for at least 50,000 of the animals annually, without reducing the population level (Southern, 1964). An intensified earth-gassing campaign is obviously going to make some impact on the numbers of London's Foxes, but the animals' future seems as assured as that of the Coyotes in Los Angeles, which, as Froman (1961) points out have for years been more than holding their own against the Federal hunters of the Branch of Predator Control of the U.S. Fish and Wildlife Service. The Fox may well become as much of the London suburban scene as the Blackbird and the Grey Squirrel. It is already an animal which Londoners find worth watching.

ACKNOWLEDGEMENTS

I must express my gratitude to all those who have helped with the survey, whether by sending me newspaper cuttings, or by submitting personal records of Foxes. Some members with opportunities to study locally resident animals over long periods wrote up very detailed accounts,

and these observations have been most valuable. John A. Burton kindly made available the notes he received as Recorder of Mammals over the years 1963 to 1965.

It has not been possible to use all the material, but no contributor need feel that his or her part in the work was not appreciated because no specific mention has been made of it. This applies especially to those who sent information on Foxes outside the suburban area.

I should like to add my sincere thanks to all those officials of the Infestation Control Laboratory and the Regional/Divisional Service of the Ministry of Agriculture, Fisheries and Food who have given me their time, and especially to Miss M. Neve, Mr. H. V. Thompson, Mr. Gardner, Mr. J. D. Norris, Mr. G. H. Pattinson and Mr. P. F. Williams. I am very grateful to Mr. Thompson for his helpful criticism of the final draft.

I must also thank Dr. Geoffrey Beven and Patrick Morris for criticising the original typescript with frank and friendly ruthlessness and Mr. Morris also for help with the research.

A full list of contributors appears below:—

J. Allan, Mrs. Allen, E. F. Anderson, M. S. Andrews, A. Archer, Miss N. Armstrong, Miss B. Bailey, Mrs. J. Ballard, R. Ballard, W. Barker, D. Barnard, I. R. Beames, Beddington Ringing Group, Dr. G. Beven, P. F. Bonham, C. Bowlt, Miss L. Braham, J. Brock, Miss E. P. Brown, J. T. Burrell, C. E. Bursey, Mrs. E. Burton, J. A. Burton, Dr. Campbell, M. J. Carter, C. P. Castell, Miss O. K. Chapman, B. H. Clark, Miss E. M. Clark, D. J. B. Cooper, Dr. G. B. Corbet, B. Croft, P. W. E. Currie, Miss J. R. Damon, P. Davey, C. H. Dean, R. Dedman, R. A. Dewey, N. Dorset, Miss F. E. Duckett, G. S. T. Elliott, D. J. Elmer, Mrs. Elson, Miss M. H. Elson, A. H. Facey, B. H. Fletcher, F. E. E. Fox, K. Fox, H. J. Freeman, Mrs. P. A. Freshwater, Miss M. Fryer, Mrs. M. A. Galloway, Mr. Gardner, Miss N. Goom, Miss T. Gompertz, Dr. D. Gough, P. J. Grant, V. Green, S. Griffiths, J. H. Grimstone, G. H. Gush, P. D. Hager, J. G. Handy, J. R. Hare, Mrs. I. W. Harvey, J. G. Harvey, E. Herbert, S. Hewetson, Miss E. M. Hillman, Mrs. C. E. M. Holland, G. Holland, F. J. Holroyde, L. Hughes, A. M. Hutson, K. H. Hyatt, P. C. Jerrard, D. Keeley, W. Keeley, Miss P. Keller, Miss L. Kennedy, Miss M. E. Kennedy, R. H. Kettle, A. S. Keith, H. King, P. Kinnear, Miss B. A. Kneller, C. Kubale, R. J. A. W. Lever, J. C. Lord, Mrs. D. E. Lowe, Miss M. McNally, R. Major, I. Manklow, Miss A. Marchant, N. A. Martin, D. Massey, J. V. Mead, B. S. Meadows, A. B. M. Mills, P. J. Morgan, J. Morris, P. A. Morris, R. Morris, P. A. Moxey, J. Mouston, Miss M. Neve, J. D. Norris, W. Owens, D. Parr, W. D. Park, G. H. Pattinson, Mr. and Mrs. R. I. Payne, Mrs. E. Peal, R. E. F. Peal, R. Peters, B. P. Pickess, Mr. and Mrs. L. G. Pine, W. Pollard, Dr. Potter, Miss M. Pugh, R. Redfern, F. C. Reeves, R. C. Righelato, T. Round, R. B. Royston, B. L. Sage, R. F. Sanderson, Miss Silverman, Mrs. L. M. P. Small, F. J. Speakman, Miss K. E. Springett, S. D. G. Stephens, G. Sturrock, J. Sturrock, Mrs. J. E. Sturrock, M. Sturrock, J. B. Tatum, G. Taylor, Mrs. J. F. Teagle, W. G. Teagle, H. V. Thompson, Miss D. M. Thunder, P. C. Tinning, S. Tipper, D. Tulett, A. Turner, E. Venis, A. Verrall, N. Vessey, Mrs. D. Vosper, H. J. Vosper, E. Wade, H. Walden, A. Warne, R. B. Warren, R. Warwick, J. Watkins, A. C. Wheeler, K. White, R. V. White, N. Wilkie, P. F. Williams, P. J. Wilson, Mrs. G. Winney, A. Woodhams, Dr. D. W. Yalden.

SUMMARY

1. An enquiry into the distribution of the Red Fox *Vulpes vulpes* (L.) over the whole of the London Natural History Society's Area was carried out over the years 1959 to 1965, but most of the information obtained was related to the animal and its behaviour in the London suburbs.
2. Methods of detecting the presence of Foxes are described.
3. The difficulties of defining the limits of London's suburbs are discussed. The area considered (illustrated by a map, Fig. 1) extends from Enfield, Middlesex, and the Hertfordshire border in the north to Caterham, Surrey, in the south, and from Romford, Essex, in the east to Ashford, Middlesex, in the west.
4. Records of suburban Foxes for the years 1930 to 1958 are considered. Foxes were known throughout this period from a number of localities, particularly Hampstead Heath, Middlesex, and there was evidence in the 1940s that the animals were becoming commoner in suburban Surrey and Kent. There is little, however, in the L.N.H.S. records to suggest any large scale infiltration into the suburbs generally.
5. Records for the period 1959-1965 were mapped on a 1 km. National Grid basis. Few records were obtained from members of the L.N.H.S. living in the Essex sector of the Society's Area, but information supplied by the Ministry of Agriculture, Fisheries and Food shows that Foxes have penetrated into London as far as Barking, Leyton and Wanstead. In Kent Foxes live within six miles of St. Paul's Cathedral, and in Surrey there have been occurrences as close to the centre of London as Streatham, Dulwich and Lambeth. In Middlesex the innermost limit of the breeding population still seems to be Hampstead, but Foxes have been recorded as far into London as Hyde Park.
6. Foxes are shot and gassed, but they are encouraged and deliberately fed by many Londoners. The contents of dustbins attract Foxes to suburban gardens.
7. Breeding sites in the London Area are often located under or near buildings, especially in private gardens. Industrial sites, sewage farms, cemeteries and railway embankments provide suitable places for earths. Families of three to four cubs have usually been noted, but up to eight have been recorded.
8. Research has shown that the Fox has catholic tastes in diet, and that when the numbers of Rabbits *Oryctolagus cuniculus* (L.) were reduced by myxomatosis it turned its attention more to smaller mammals, especially the Short-tailed (Field) Vole *Microtus agrestis* (L.). In the London suburbs Foxes are known to feed on rats, but most small rodent species would be less numerous than in rural areas. The extent to which Foxes prey on domestic cats appears to have been greatly exaggerated. Waterfowl are taken from public parks, and dead birds are eaten when found. Deaths considered attributable to dieldrin poisoning have been recorded from the London Area. Many Foxes feed on household waste.

9. The spread of the suburbs has interfered with hunting, and has benefited the Fox in many ways. The railways serve as routes by which it can penetrate the built-up area, and roads are also used, even in daylight. Foxes have moved into several English towns and cities. Control measures in towns are subject to restrictions, and there are numerous sanctuary areas.
10. The diet of suburban Foxes would be worthy of detailed study.
11. Ways in which the suburbs of London have been colonised are discussed, and it is thought that the present state of affairs has arisen as a result of invasion rather than through an increase in existing populations which became isolated when the suburbs spread.
12. Two factors which may have initiated an invasion are discussed, (1) hard winters, and (2) the effects of myxomatosis, but neither is considered a satisfactory explanation.
13. The future of the Fox in the London suburbs would seem to be assured.

REFERENCES

- ANON., 1952, Fox-hunting up to date. II—Scarlet and tractor in harmony. *The Times*, 8.iii.52.
- BEVEN, G., 1957, The distribution of the Grey Squirrel in the London Area (1955-1956). *Lond. Nat.*, 36, 6-10.
- BEVEN, G., 1965, The food of Tawny Owls in London. *London Bird Report*, 29, 56-72.
- BURTON, JOHN A., 1966, Notes on mammals in the London Area during 1963 and 1964. *Lond. Nat.*, 45, 29-34.
- CHRISTIAN, GARTH, 1963, *While some trees stand*. London.
- COLLENETTE, C. L., 1937, *A history of Richmond Park*. London.
- COOKE, J. COLEMAN-, 1965, *The harvest that kills*. London.
- CORBET, G. B., 1964, *The identification of British mammals*. A publication of the British Museum (Natural History), London.
- CORBET, G. B., 1966, *The terrestrial mammals of Western Europe*. London.
- CRAMP, S. and TEAGLE, W. G., 1952, The birds of Inner London, 1900-1950. *British Birds*, 45, 433-456.
- FITTER, R. S. R., 1945, *London's natural history*. London.
- , 1949, A check-list of the mammals, reptiles and amphibia of the London Area, 1900-1949. *Lond. Nat.*, 28, 98-115.
- , 1960, Further records of mammals, reptiles and amphibia in the London Area. *Lond. Nat.*, 39, 18-21.
- FITZGERALD, BRIAN VESEY-, 1965, *Town fox, country fox*. London.
- FORBES, U. A., 1911, Sport ancient and modern, in *V.C.H., Middlesex*, 2, 253-301.
- FROMAN, ROBERT, 1961, *The nerve of some animals*. London.
- HINTON, T., 1935-1939, Unpublished diaries.
- HUDSON, W. H., 1898, *Birds in London*. London.
- HURRELL, H. G., 1962, *Foxes*. London. *Sunday Times* Publications. Animals of Britain, No. 9.
- LANCUM, F. HOWARD, 1947, *Wild animals and the land*. London.
- , 1951, *Wild mammals and the land*. Ministry of Agriculture, Fisheries and Food Bulletin No. 150. H.M.S.O., London.
- LEUTSCHER, ALFRED, 1960, *Tracks and signs of British animals*. London.
- LEVER, R. J. A. W., 1959, The diet of the fox since myxomatosis. *J. Anim. Ecol.*, 28, 359-75.
- MATTHEWS, L. HARRISON, 1952, *British mammals*. London.
- MILLAIS, J. G., 1904, *The mammals of Great Britain and Ireland*. 1. London.
- MINISTRY OF PUBLIC BUILDING AND WORKS, 1964, Selected observations in Greenwich Park based on reports by W. G. Teagle, E. C. Dickinson, P. C. Tinning and D. C. Webster in *Bird life in the Royal Parks*, 1961-62. H.M.S.O., London.
- MINISTRY OF WORKS, 1953, Observations in Richmond Park based on the reports of R. W. Hayman, P. G. Clinkskel, B. A. Marsh and E. D. Bushby in *Bird life in the Royal Parks*, 1951-1952. H.M.S.O., London.
- MOORE, N. W., 1957, The past and present status of the Buzzard in the British Isles. *British Birds*, 50, 173-197.
- MORRIS, P., 1966, The Hedgehog in London. *Lond. Nat.*, 45, 43-49.
- RIGDEN, R. G., 1955, The fishes, amphibians, reptiles and mammals of Woolwich and surrounding localities. *Lond. Nat.*, 34, 48-53.
- RODE, PAUL, and DIDIER, R., 1946, *Atlas des mammifères de France*. Paris.
- SOUTHERN, H. N. (Ed.), 1964, *The handbook of British mammals*. Oxford.

- SOUTHERN, H. N. and WATSON, J. S., 1941, Summer food of the Red Fox (*Vulpes vulpes*) in Great Britain: a preliminary report. *J. Anim. Ecol.*, 10, 1-11.
- TAYLOR, G., 1962, The animal life of the Heath. *Hampstead and Highgate Express*, 15.vi.62.
- TAYLOR, J. C. and BLACKMORE, D. K., 1961, A short note on the heavy mortality of foxes during the winter, 1959-60. *Veterinary Record*, 73 (10), 232-233.
- TEAGLE, W. G., 1963, Mammals in the London Area. A report for 1960 with some records for the years 1957-1959. *Lond. Nat.*, 42, 42-56.
- , 1964, Mammals in the London Area, 1961. *Lond. Nat.*, 43, 119-135.
- , 1965, Mammals in the London Area, 1962. *Lond. Nat.*, 44, 43-57.
- TEMBROCK, G., 1957, Zur Ethologie des Rotfuchses (*Vulpes vulpes* (L.)), unter besondere Berücksichtigung der Fortpflanzung. *Zool. Gart. Lpzg.*, 23, 289-532.
- THOMPSON, HARRY V. and WORDEN, ALASTAIR N., 1956. *The Rabbit*. London.
- WHALL, T. J., 1963, *Badger notes. Observations at a Charnwood set.* Surveys of Leicestershire Natural History: supplement to No. 2, *The Badger in Charnwood Forest* by A. E. Squires. Loughborough.
- WHITING, JAMES E., 1912, The mammals of Hampstead. In *The annals of Hampstead* (vol. 3) by Thomas J. Barratt. London.

Reptiles and Amphibians in the London Area 1965-1966

By D. W. YALDEN, B.Sc., Ph.D.

THIS paper is intended to cover the records of herptiles received since writing the previous report up to the end of 1966, thus leaving a tidy situation for my successor, P. C. Tinning. Most of the records therefore refer to 1965 and 1966, though there are some pre-1965 records included which were not available at the previous time of writing, and there are undoubtedly some 1966 records outstanding.

Maps have been used for recording the distribution of these animals, in the way indicated by Burton (1966) for mammals. This gives a method of quantifying our knowledge (or ignorance) of the distribution of the species concerned. There are within the 20-mile radius of the London Area some 3,270 one kilometre grid squares (not all of them completely included, of course); in the following report, the number of one kilometre grid squares from which I have received a definite record of a species from 1959 on is quoted. These figures are perhaps minima, partly because records are sometimes not precise enough to be mapped, but especially because I have not attempted to combine the records of the Essex Field Club with those of the London Natural History Society. It is clear from their published reports (Wheeler *et al.* 1959, Malenoir 1963, 1964) that

their thorough field work could add 6-10 grid squares to the totals of most species from the Epping Forest area alone, quite apart from the rest of Essex.

The figures for the number of grid squares from which a species has been recorded also gives some measure of the progress made in recording. To take the most recorded species, at the end of 1964, there were definite records of the common toad *Bufo bufo* from 48 squares; at the end of 1965, the figure was 68; and at the present time of writing, January 1967, the total is 78. This is, of course, a running total, and makes no allowance for the possible extinction of the animal from squares in which it has been recorded earlier. Nevertheless, some progress is indicated, even though this total of 78 represents only $2\frac{1}{2}\%$ of the London area.

The detailed records are presented in the style previously adopted; the letters E, H, K, M, and S, represent the counties, London not being recognised as a county for these purposes. (The recent changes in the county boundaries, which are probably not the last, emphasize the value of retaining the oldest boundaries for our purposes.) Other abbreviations include G.C.—Golf Course; G.P.—Gravel Pit; L.N.R.—Local Nature Reserve; Res.—Reservoir.

Finally, I must acknowledge the help of John Burton, who drew the maps for publication, and the efforts of the various people whose records made this report possible; they are indicated in the list of records by their initials:—

Dr. G. Beven, Miss E. P. Brown, N. J. Burton, R. A. Dewey, G. H. Gush, H. Hurford, Miss L. Kennedy, H. King, P. Kinnear, Lewisham Natural History Society (Lew), N. A. Martin, P. A. Morris, P. A. Moxey (PAMY), A. F. Mussellwhite, B. P. Pickess, Miss H. Reed, F. C. Reeves, R. B. Warren, Miss D. E. Woods, D. W. Yalden.

AMPHIBIA

URODELA

Triturus vulgaris (L.) Common Newt.

Justifying my comment "Undoubtedly the commonest newt in the Area" (Yalden, 1965), this species is recorded from 44 one kilometre squares. Moreover, this is almost double the number (24) from which it was known at the time of that report.

E Harold Wood, 6 in garden pond, 1965 (RBW); Woodford, one seen Aug. 1965 (DEW); Tilbury, seen on 4 occasions, with 4♂ in breeding dress and 2♀ on Mar. 26, 1965 the maximum (AFM). Epping Forest "continues to hold its own in all Forest ponds . . . is also found nearer to London, being extremely common in most of the ponds in the Forest in the Walthamstow area" (Malenoir, 1963).

M Finchley, c. 50 found when a wall was knocked down at Woodhouse Grammar School, Jul. 1962 (NAM); Ruislip L.N.R., several adults seen 1963, and tadpoles seen every year 1962-1965 (BPP); Feltham, 5 seen at Hatton G.P., Sep. 5, 1964 (RAD).

S Weybridge and Addlestone, recorded from 6 ponds, 1965 (GHG); Oxshott Clay pit and Epsom Common, recorded again, 1965 (HK, FCR); Bookham Common, 4 caught, Apr. 3, 1965, including 3 from Gunpit B, where it does not seem to have been recorded previously (PAM, DWY); Ashted, one caught Mar. 20, 1966 (PAM).

Triturus helveticus (Razoumowski). Palmate Newt.

This is probably the rarest of the newts, but certainly the most restricted in its distribution. I have definite records of it from only 4 squares, though this, as mentioned, is without the Epping Forest records.

E Epping Forest, evidently remains "surprisingly the most common newt" (Malenoir, 1963).

S Weybridge, one pond only. 2♂ caught May 10, 1965 (GHG); Bookham Common, 2♂, 4♀ caught in one of the known localities Apr. 3, 1965 (PAM, DWY).

Triturus cristatus (Laurenti). Crested Newt.

The records of this species are sparse and scattered, it being recorded from only 13 squares.

E Malenoir (1963) reports 4 more localities for this species in Epping Forest than were known at the time of the earlier report (Wheeler *et al.* 1959).

K Sydenham, one found among boxes in a council yard, May 12, 1966 (PK). This is the only new locality for this species in the last two years, though it is not far from the Dulwich records (in Yalden, 1965).

S Weybridge, 7 caught and released, May 29, 1965 (GHG); Bookham Common, 2 caught Apr. 3, 1965 (PAM, DWY); both these being known localities.

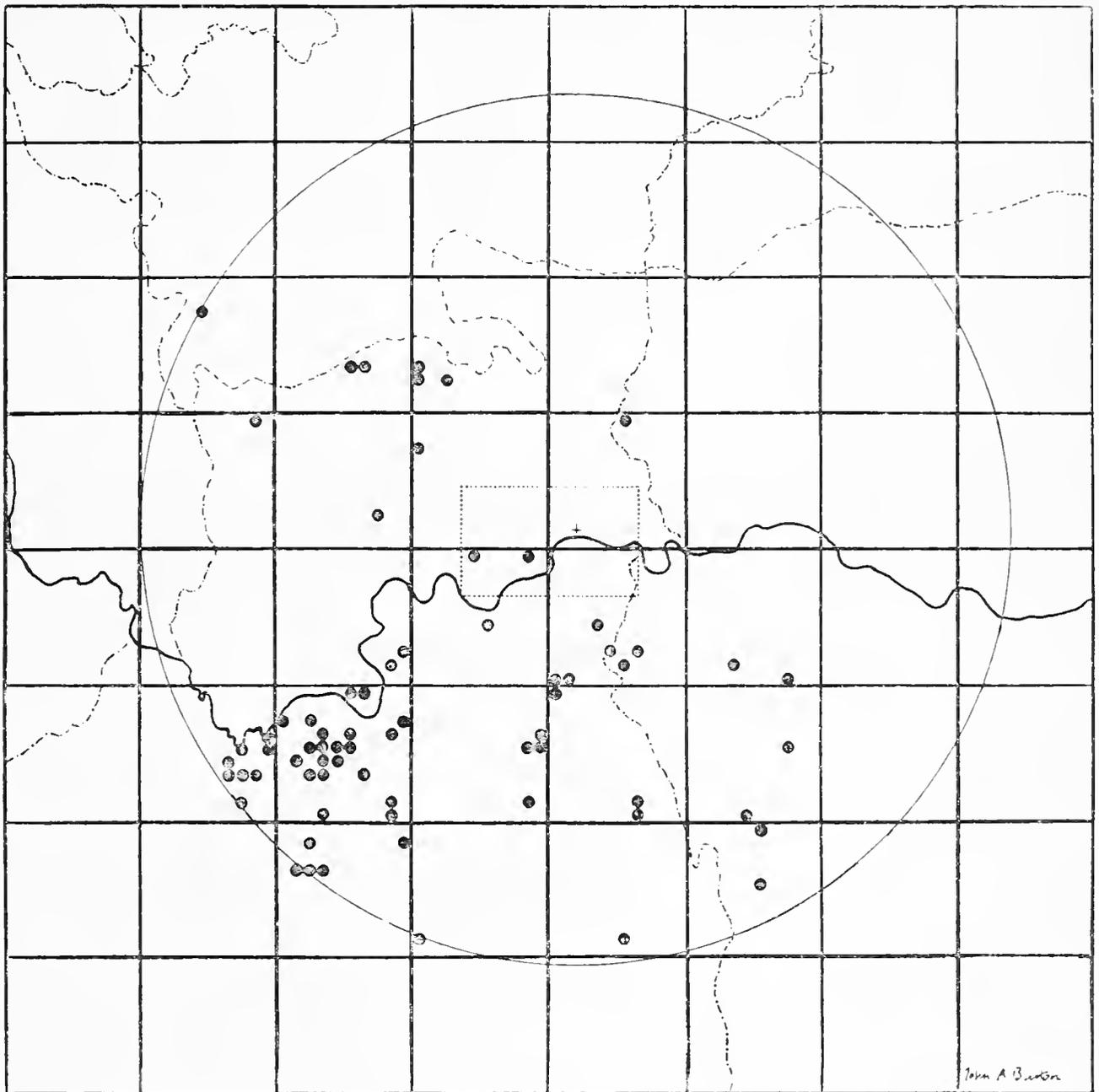
ANURA

Rana temporaria L. Common Frog.

It is encouraging to report an improvement in the apparent status of this species, at least in the Surrey sector, where GHG and PAM have made an effort to census a number of ponds during the breeding season.

It seems probable from the account of spawning given by Savage (1961) that the female frog releases all her eggs at once. Thus a count of the number of clumps of spawn should give a good idea of the size of the colony even when the frogs are no longer present. Indeed, such a count is probably more reliable than trying to count the amphibians directly, as Savage also shows that the females often spend only one night in the breeding pond. It is hoped that other observers will try to conduct similar censuses of this species in their own areas. It is important for these purposes to know the dates on which breeding is likely to have occurred. Savage (*op. cit.*) gives a map of the British Isles showing the mean dates of spawning, and London lies in the zone year-day 70 to year-day 80, i.e. Mar. 10 or 11 to Mar. 20 or 21. I have 23 dated records of spawn being found, from Mar. 2 to Apr. 15. However, only three of these are earlier than Mar. 20 (Mar. 2, 1961, Holland Park; Mar. 12, 1960, Catford; Mar. 13 1966, Bookham Common) and the period Mar. 20 to Mar. 28 would seem to be the most useful for frog censusing (10 of the 23 records refer to this period).

The distribution map shows that the species still occurs over the majority of the area where (by comparison with that for the toad) observers are present. Indeed, there is some suggestion that the species persists in the inner part of the London Area rather better than does the toad. The frog is recorded from 70 one kilometre squares, 18 of which are within an inner 10 mile radius.



Common Frog (*Rana temporaria*), Distribution in the London Area. 1959-1966.

- E Epping Forest, continues rather scarce, "due to its unfortunate habit of spawning on the edges of ponds, . . . in easy reach of children or anyone collecting spawn". However, greater numbers of young frogs than usual were found on Baldwins Hill, Aug. 1961 (Malenoir, 1963).
- K Sydenham, one found in Mayow Park, Jun. 11, 1966; Ruxley G.P., one found dead, Oct. 15, 1966 (PK).
- M Ruislip L.N.R. about 12 pairs spawned in 1962, an indefinite but increased number in 1963, and about 100 pairs at one site and 20 pairs at another in 1964; however, on Feb. 13, 1965, the feeder stream was polluted by creosote and turpentine when thieves ransacked a factory upstream, and over 170 frogs, mostly adults, were found dead or dying on Feb. 20; a survey of the spawning areas on Mar. 28 confirmed the damage to the population, for while about 10 ♀♀ spawned at one site, at the other, main, site, only about 15 ♀♀ had spawned (BPP, *pers. comm.*, and Pickess and Snow, 1966). This unfortunate incident only demonstrates how difficult conservation in the London

Area may be; it is especially unfortunate since this was by far the largest known colony in the London Area, which may emphasise the value for this species of protection of the breeding site from children and perhaps collectors. Stanmore, 1 seen Jul. 27, 1965 (PAMy); Holland Park, frogs spawned in usual pond, Mar. 28, 1965 (EPB).

- S Weybridge and Addlestone, GHG reported good quantities of spawn from 5 ponds in 1965, about 50 clumps of spawn at one site, and about 40 clumps at another. However, 3 ponds at Esher which had spawn in 1965 were apparently unproductive in 1966, though the date of checking, Mar. 8, may have been too early (PAM). Epsom, Ashted, Leatherhead, 3 ponds examined Mar. 20, 1966 had 43, 24, and 30 clumps of spawn respectively (PAM). The only records from other areas were Bookham Common, spawn in one pond on Apr. 3, 1965 (PAM, DWY) and in two ponds on Mar. 13, 1966 (FCR); Godstone Pond, one immature Jan. 19, 1966 (PK).

Rana esculenta L. Edible Frog.

The continued status of this frog as a member of the London fauna remains doubtful.

E Epping Forest, "no record since 1959" (Malenoir, 1963).

K Beckenham, several large frogs lacking the black temporal patch of *R. temporaria* seen in a small pond on Apr. 11, 1964, were thought to be of this species, and perhaps referable to *R. e. ridibunda* (PK). If confirmed, this provides an interesting new site for the species.

S Esher Common, one or 2♂ heard on three occasions in 1965, but not recorded in 1966 (PAM, HK).

A further suggestion regarding the origin of this colony has been made. It was originally suggested (Yalden and Morris, 1961) that these frogs escaped from the garden of Dr. (now Prof.) J. L. Cloudsley-Thompson at Lower Green, Esher. PAM was recently informed by an Esher U.D.C. workman that the frogs were introduced from the continent to a garden in Blackhills Road, which adjoins the Common on the north-east side, during 1945-1950, but proved too noisy and were released in Black Pond. In the absence of further details, it is not possible to check this further, but this explanation does seem more likely than the earlier one, which would have required that the frogs migrated right round Esher through some rather unlikely areas.

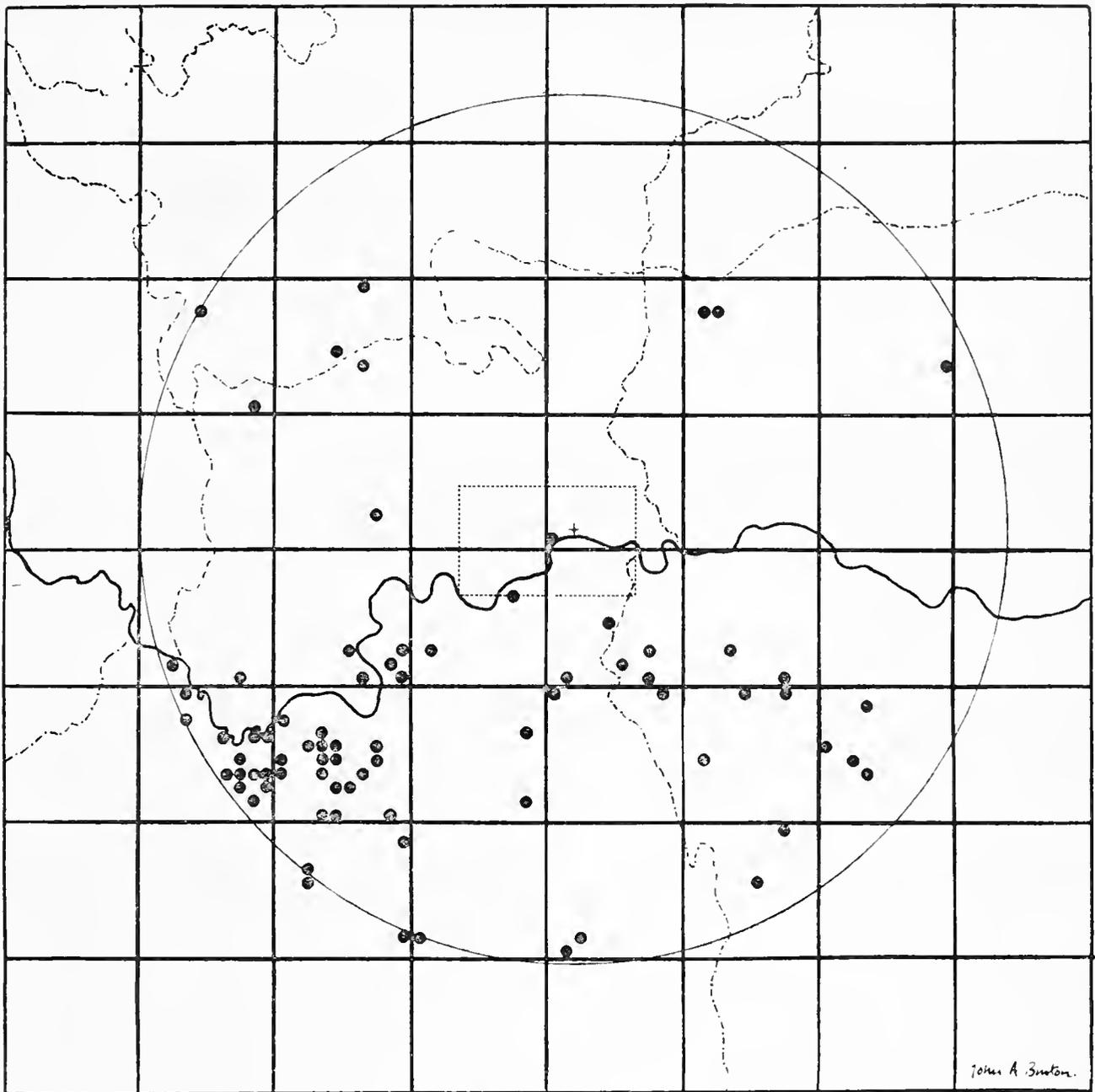
Bufo bufo (L.) Common Toad.

As was remarked above, the distribution so far recorded for this species is similar to that for the common frog. The toad is the best recorded species of herptile in the London Area, and is recorded from 78 one kilometre squares, but only 14 of these are within 10 miles of St. Paul's (cf. the figures for *Rana temporaria*).

As with *Rana*, an effort to census the breeding populations of this species would be most valuable, though here a direct count of the toads is the only practicable method. I have only 10 dated records for the presence of toad spawn, from Mar. 20 to Apr. 9, though there are records of toads present in the breeding ponds as early as Mar. 8.

E Brentwood, one seen Sept. 17, 1965 (RBW); Epping Forest, "continues to be the most numerous amphibian in the Forest" (Malenoir, 1963).

H Radlett, one seen in a garden, Jul. 26, 1965 (PAM).



Common Toad (*Bufo bufo*), Distribution in the London Area. 1959-1966.

- K Bromley, one observed crossing a lawn in daylight, and taking 3 hours to travel about 140 yards; a second one was killed on the road nearby Mar. 14, 1965 (LK). Bellingham, Sydenham and Beckenham, singletons seen on various dates, 1966 (Lew, PK).
- M Ruislip L.N.R., 3 found under sacking, Aug. 15, 1963 (BPP), and 2 found Jul. 12, 1964 (PAMy); (toads seen all years 1962-1965, but breeding not proved, BPP). Ruislip Lido, over 30 counted on a path after rain, May 10, 1964 (BPP). Single records from Shepperton (DWY) and Bushey (HH), 1965.
- S Weybridge, Esher, Oxshott, status remains much as previously recorded. The large colony at Weybridge maintained itself at c. 200 pairs in both 1965 and 1966 (GHG, PAM, DWY). Bookham Common. At least 50 at the main breeding site, Mar. 13, 1966 (FCR). Additional breeding sites have been found at Ashted (4 dead toads, large amount of spawn, Mar. 20, 1966), near Leatherhead (c. 50 pairs in one area, and others on the other side of the pond, Mar. 28, 1965), and near

Egham (PAM, DWY, *et al.*), also at Epsom (40-50 in a pond Mar. 12, 1966, F.C.R.). There are further sight records from Addlestone, Thames Ditton, Dulwich and Box Hill (GHG, PAM, NJB, and GB respectively).

REPTILIA

LACERTILIA

Lacerta vivipara Jacquin. Common Lizard.

Recorded from 50 squares, making it the best known of the reptiles.

- E Tilbury, up to 3 seen on 3 occasions 1958-1959, and singletons on 4 occasions in 1966 (AFM), Woodford, one ♂ seen in a garden, Aug. 1965 (Lew).
- M Ruislip L.N.R., one large ♀, Jul. 29, 1962, and 2 seen Aug. 1964 (BPP).
- S Esher, Oxshott, Claygate, recorded on 42 occasions from 7 known sites, 1965 and 1966 (HK, PAM, DWY). HK counted 11, all ♂ at one site on Mar. 5, 1966, and 31 on Apr. 21, the largest numbers recorded for some years; his earliest record of a ♀ lizard was over a month later than the ♂, on Apr. 9. Records from other areas include Thorpe, 4 seen, Aug. 22, 1965 GHG; Bookham Common, 2 on May 16, 1965, 2 Aug. 29, 1965 and one on Jul. 16, 1966 (FCR, GHG); Betchworth, one on Mar. 20, 1966 (HK); Headley Heath, 2 on Apr. 30, 1966 (PK); Mickleham, one caught May 2, 1965 (PAM, DWY); and Epsom Common, one seen on Mar. 28, 1965 (FCR).

Anguis fragilis L. Slow-worm.

This lizard has only been recorded from 24 squares, though it is probably commoner than this would suggest.

- E Tilbury Dock, one found dead, May 24, one live Aug. 17, 1965, and live individuals on 4 occasions in 1966 (AFM).
- K Otford Mount, one seen Mar. 29, 1965, and also reported present on a railway embankment at Forest Hill (PAMy). Shoreham, one found under tin, Apr. 14, 1966 (PK).
- S Only recorded on 6 occasions, from known sites at Esher, Oxshott and Claygate (HK, PAM, DWY).

OPHIDIA

Natrix natrix (L.) Grass Snake.

Only recorded from 31 grid-squares, none of them within 10 miles of St. Paul's. (This is ignoring the record from Battersea mentioned in Yalden, 1965, on the assumption, perhaps unjustified that the snake(s) in question were introduced accidentally. Since it was killed, it seems reasonable to await further evidence for a genuine colony at that site).

- E Brentwood, one seen by Childerditch Lake, May 15, 1966 (RBW).
- M Ruislip L.N.R., seen every year 1962-1965, though numbers not noted (BPP). Colnbrook, one seen at Poyle G.P., Apr. 18, 1965 (RAD). Staines, one swimming in Queen Mary Res., mentioned by P. D. Howse in a letter to *The Field* of Nov. 18, 1965.
- S Oxshott, recorded on 16 occasions, only singletons on 7 of them, but 9 found basking on Apr. 30, 1965 (κ). Esher, one swimming in Black

Pond at dusk, Jul. 15, 1966 (HK). Thorpe, one seen Aug. 22, 1965 (GHG). Cobham, one reported killed by police at 72, Anyards Road (*Esher News*, Jun. 25, 1965). Bookham Common, one caught, 2 others seen, Apr. 3, 1965 (PAM, DWY), singletons on Aug. 1, 1965 (GHG), May 8, 1966 and Jun. 26, 1966 (FCR).

Vipera berus (L.) Adder.

There has been no increase in our knowledge of the distribution of this species in the London Area, and it is recorded from only 8 grid squares.

E Epping Forest, Malenoir (1963) suggests that there has been some decrease in numbers, but has found the species in new areas as well. In a general survey of herptiles in Essex (Malenoir, 1964), numerous records of the species from coastal areas are noted, including Tilbury Dock, at the eastern edge of our area.

ALIENS

There is only one addition to make to the records in the previous paper. *Natrix tessellata* (Laurenti.) Tessellated Snake.

E Malenoir (1963) records finding two snakes of this species in Epping Forest.

REFERENCES

- BURTON, J. A., 1966, The distribution of weasel, stoat, common shrew, roe deer, water shrew and mole in the London Area. *Lond. Nat.*, **45**, 35-42.
- MALENOIR, G., 1963, Further notes on the reptile and amphibian survey of Epping Forest, 1959-1961. *Essex Nat.*, **31**, 141-147.
- , 1964, The reptiles and amphibians of Essex, 1960-1961. *Essex Nat.*, **31**, 190-193.
- PICKESS, B. P. and SNOW, W. F., 1966, Observations on the effects of pollution on the East Stream of the Reserve. *Ruislip Dist. nat. Hist. Soc.*, **15**, 10-12.
- SAVAGE, R. MAXWELL, 1961, *The ecology and life history of the common frog*. London, Pitman.
- WHEELER, A. C., MALENOIR, G. and DAVIDSON, J., 1959, A first report on the reptiles and amphibians in Epping Forest. *Essex Nat.*, **30**, 179-188.
- YALDEN, D. W., 1965, Distribution of reptiles and amphibians in the London Area. *Lond. Nat.*, **44**, 57-69.
- YALDEN, D. W. and MORRIS, P. A., 1961, Edible frogs at Esher. *Brit. J. Herpetol.*, **3**, 17.

Some studies on Common Carp (*Cyprinus carpio* L.) and Crucian Carp (*Carassius carassius* L.) in a small Middlesex pond.

By DAVID MARLBOROUGH (Recorder of Fishes)

INTRODUCTION

THE water considered was Moat Mount Open Space Lake, Mill Hill (Grid Reference Sheet 160/213941). It was constructed earlier in this century by damming a stream running down a clay hill; there is still replacement of water which is lost from the concrete dam. This one-acre water is almost totally surrounded by trees, and contains an isolated tree-lined island. The bottom is mud and leaf detritus over London Clay; the dominant plant is *Potamogeton crispus* which covers most of the water between May and July. Measurements of the pH of this water were performed on January 8, 1961 with a B.D.H. Phenol Red Capillator. The mean value was 7.1 and the range 6.6 to 7.8.

The temperature variations have been described elsewhere by the author (Marlborough, 1963a).

The two species of Carp shared with the water with a variety of other fishes, Roach (*Rutilus rutilus* L.), Rudd (*Scardinius erythrophthalmus* L.), Tench (*Tinca tinca* L.), some feral Goldfish (*Carassius auratus* L.), Perch (*Perca fluviatilis* L.), Gudgeon (*Gobio gobio* L.), and Pike (*Esox lucius* L.). All these fish found their way into the water at varying times after 1943, when the pond was temporarily drained (Cave, pers. comm.).

The author had known and fished the water since 1950-1951. Continued interest and proximity to it led to an examination of the Carps' characteristics, using the author's angling diaries. Further information was gained by a tag-and-recapture programme during the summer of 1961 when lengths, weights and scales were taken. This information was also incorporated. The greater aim of the programme, to determine the population and movements of the Carp, was not a full success owing to probable infections of the tag wounds (Marlborough, 1963b).

It was intended to continue the examination of the Carps into 1962 and beyond, but the bad winter of 1962-1963 killed the bulk of the carp population (Marlborough, 1964a).

METHODS

Examination was first made of the author's angling records, kept in detail between December 30, 1954 and September 29, 1959. These yielded information of dates, species, numbers, weights, and other information not used in the present analysis. Angling is not an ideal method of sampling a population of fishes, though used in America (e.g. Lagler, 1952). But here it was the only method allowed by the controlling authority, Hendon Borough Council (now London Borough of Barnet).

The tagging programme was initiated with the permission of the Borough Engineer: captures and recaptures were both by angling. The programme of captures lasted from June 17 to September 5, 1961. Besides fitting tags on the gill covers, as described in Marlborough, 1964b,

the length from snout to tail fork (fork length, or "FL"), the weight, and scales from the flanks, were also taken. The scales were examined by Mr. Craig-Hine of the Department of Zoology, University of Liverpool, for overall age assessment.

Weights and numbers of the two species of Carps caught in the tagging programme were incorporated into similar data from the angling diaries. In addition the 1961 season fish lengths could be analysed, and their ages considered. These were useful extra information, though from a small sample.

OBSERVATIONS AND DISCUSSION

Lengths and weights were taken in the field in English units (inches and pounds or ounces). They are used below without conversion into metric units, this being normal practice in fishery biology and thus making comparison with other literature easier (e.g. Lagler 1952 and Rounsefell and Everhart 1953). Metric conversions can be found in these and other references.

(a) *Weights of Carp.* The pooled diary and tag programme results were analysed to provide the range of weights and mean weights for the two Carp species.

TABLE I

Fish species	Minimum Weight ozs.	Maximum Weight lbs. ozs.	Total Numbers	Mean Weight ozs.
Crucian Carp	4	1 8	107	8.6
Common Carp	4	3 10.5	210	10.4

The respective rod-caught records of these two species are: Crucian Carp, 4lbs. 11ozs., Common Carp, 44lbs. (Jones and Tombleson, 1964). It seems plain that these fish are small both in maximum size and mean size. Of course, the largest fish the author has caught may not be the largest in the pond—only the largest in the sample. But even rumour never claimed a Carp over seven pounds in this water!

The analysis was continued to find the mean sizes of fish caught in each season, this being a probable indication of the order of the growth rate of the two species. The methods of angling and baits (bread) changed but little over the period of the records.

TABLE II

Fishing Season	Crucian Carp		Common Carp	
	Number of Fish	Mean weight ozs.	Number of Fish	Mean weight ozs.
1954-55	8	4.4	0	—
1955-56	22	5.7	72	8.1
1956-57	24	8.0	32	7.2
1957-58	24	8.7	53	10.3
1958-59	8	9.7	20	12.0
1959-60	2	16.5	5	13.4
1961-62	19	13.7	28	14.5

The angling season extends from June 16 one year to March 15 the next; activities and records were naturally spaced in this way and are so continued in the table.

It will be noted from Table II that the mean weight does seem to increase with successive seasons, though with some distortions seemingly due to the smallness of samples in certain years. If the mean-weight increases are a reflection of the growth rate, as seems probable, then this is undoubtedly slow.

The two species taken together in Table II seem to show that the Crucian Carp are growing better than the Common Carp. Compared with national records, the maximum weights seem to show this: for Crucian Carp, the maximum is almost a third of the national record, for Common Carp, barely a twelfth. Little information exists for Crucian Carp growth increments or sizes in other waters; Common Carp are much better documented. The conclusion from the study of Common Carp increments as in Table II is that those in Moat Mount grow slowly and are definitely stunted. On Crucian Carp, there is no contrary evidence that the increments in Moat Mount as reflected in Table II are lower than one might expect.

It may be possible to hazard a guess that the Crucian is better ecologically adapted for a pond such as Moat Mount.

(b) *Relative Abundance.* Tables I and II both show that Common Carp are always more abundant than Crucian Carp in the catches from this water. The actual proportions in captures vary from angling season to angling season, but this could be due to a variety of environmental or sampling factors. The consistency with which the Common Carp are more abundant however seems a reflection on the true relative abundance of the two species. It may even be that the greater number and stunted size of the Common Carp are related.

(c) *Relationship of Length and Weight.* The fork length measurements of the 1961 programme were used to draw up Table III, to indicate their relationship with weights.

TABLE III

FL inches	Crucian Carp		Common Carp	
	Number of Fish	Mean weight ozs.	Number of Fish	Mean weight ozs.
7	1	5	0	—
8	1	8	0	—
8.5	0	—	2	6
9	5	11	1	9
9.25	0	—	1	10
9.5	2	13	3	11.3
9.75	0	—	1	10
10	4	14	2	10.5
10.25	1	15	0	—
10.5	3	16.3	4	13
10.75	0	—	1	14
11	2	19	9	14.5
11.5	0	—	2	17
13	0	—	1	28
18	0	—	1	54

Crucian Carp have been little worked on, but a compendium of relevant figures exists for Common Carp (Carlander, 1953). His pooled results for fork length and weight are similar to those quoted above, showing that the shape of Moat Mount Common Carp is not very different from the norm.

A widely-used measurement of the length/weight relationship is the "coefficient of condition" or "ponderal index". This is discussed in Carlander and also Lagler. It is based on the relationship

$$W \propto L^3 \quad \text{where } W \text{ is the weight in pounds} \\ L \text{ is the length in inches.}$$

Therefore $W = CL^3$ where C is the "coefficient of condition".

For fishery purposes "C" is calculated as:

$$C = 10^5 \cdot \frac{W}{L^3}$$

Conversions of "C" into metric units can be sought in the references quoted.

Values of "C" were calculated for different length ranges of the two species in the 1961 samples.

TABLE IV
CRUCIAN CARP

FL range inches	Mean value "C"	Number of fish
7-8	92	2
9-10	90	11
10-11	80	6
OVERALL	87	19

TABLE V
COMMON CARP

FL range inches	Mean value "C"	Number of Fish
8.5- 9.5	75	7
9.5-10.5	67	7
10.5-11.5	72	12
13	79	1
18	56	1
OVERALL	69	28

The extreme range of values of "C" for Crucian Carp is 74 to 120, of Common Carp 51 to 100. Though there is thus a considerable overlap in the extreme ranges, the mean values in each size range and overall shows a divergence between the two species. This reflects quantitatively the shape differences between the two species as shown in Schindler (1957).

As fish noticeably change shape with age, getting plumper as they get older, it was hoped the display of "C" for differing size ranges would show a change in its value: but probably no valid differences can be seen with such small samples.

(d) *Age Determinations.* Though scales were taken from the great majority of fish taken in the 1961 programme, only a few proved suitable for reading. This was largely due to the very high incidence of accident or replacement centres in the scales. The author attributes this to the heavy angling pressure on these fish, which means that many fish are caught regularly and retained in keepnets, dislodging scales frequently.

Those which were readable have been incorporated in Table VI.

TABLE VI

FL inches	Crucian Carp Age in years	Common Carp Age in years
9	7 years	8-plus or 9-plus
9.5	7-plus	8-plus or 9-plus
10	—	10-plus with accident centre
10.25	9-plus	—
10.5	5-plus 7-plus 9-plus	— — —
11	—	6-plus with accident centre 10-plus with accident centre 8-plus with accident centre

NOTE: This sample is much too small to make valid assertions from it alone, but must be taken in conjunction with the other data—e.g. Table II.

The difficulty of reading these scales leads to some ambiguity, but a comparison with published growth rates only confirms the earlier assessment of a stunted and slow-growing stock. Carlander for instance shows Common Carp attaining 13 inches in the second or third year, and 18 or 19½ inches in the eighth year. Unfortunately comparable data for Crucian Carp is not available, which would have confirmed the earlier assessment about them.

SUMMARY AND CONCLUSIONS

The figures and analyses given show that the Common Carp in Moat Mount prior to 1962/1963 were stunted and small in comparison with national and published standards. There is evidence that the Crucian Carp were probably growing better in proportion.

The data on weights and lengths for Common Carp can be compared with published figures, and also compared with that for Crucian Carp. Such data is unusual on the latter species and is contained herein.

REFERENCES

- CARLANDER, K. D., 1953, *Handbook of freshwater fishery biology*. Wm. C. Brown Co., Dubuque, Iowa.
 CAVE, F. J., 1961, Personal Communication from Hendon Borough Engineer.
 JONES, J. W. and TOMBLESON, P. H., 1964, *Know Your Fish*. Angling Times Ltd., Peterborough.
 LAGLER, K. F., 1952, *Freshwater Fishery Biology*. Wm. C. Brown Co., Dubuque, Iowa.

- MARLBOROUGH, D., 1963a, The surface temperature variations of a small Middlesex pond
The Naturalist April/June; 63-68.
- , 1963b, The unsuitability of Monel Metal opercular strap tags for tagging carp. *Prog. Fish. Cult.*, **25**, 155-158.
- , 1964a, "Winterkill" in a Mill Hill Pond. *Lond. Nat.*, **43**, 110-111.
- , 1964b, Tagging fish and removing scales with surgical instruments. *J. Inst. Sci. Technol.*, **10**, 19-20.
- ROUNSEFELL, G. A. and EVERHART, W. H., 1953, *Fishery Science: Its Methods and Applications*. John Wiley, New York, Chapman and Hall, London.
- SCHINDLER, O., 1957, *Freshwater Fishes*. Thames and Hudson, London.

ACKNOWLEDGEMENTS

I would like to thank Mr. F. J. Cave, Borough Engineer and Surveyor in the former Hendon Borough Council, for his assistance, ready giving of permissions, and interest; and to Dr. David Craig-Hine of the Department of Zoology, University of Liverpool, for his reading of the scales.

Hemiptera-Heteroptera of the London Area

PART IV

By ERIC W. GROVES, F.R.E.S.

SOURCES OF RECORDS

The following are new sources of records:—

57. Personal records of D. G. Hall (mainly Herts. and Surrey).
58. Personal records of B. S. Nau (Herts. and Essex).
59. Thomas, D. C., 1938, Report on the Hemiptera-Heteroptera taken in the light trap at Rothamsted Experimental Station during the four years 1933-36.
60. Records from the E. E. Syms collection of Heteroptera (acquired by L. Christie in 1966)*.

INDEX TO RECORDERS' NAMES

The following should be added to the index of recorders' names already give in Parts I, II and III:—

J. C. Armstrong	(JCA)	N. E. Hickin	(NEH)
H. F. Barnes	(HFB)	M. G. Morris	(MGM)
E. A. Butler	(EAB)	C. Morley	(CM)
P. A. Buxton	(PAB)	S. Parker	(SP)
J. A. Clark	(JAC)	M. A. Park	(MAP)
V. F. Eastop	(VFE)	H. A. Saunders	(HASa)
F.W. Edwards	(FWE)	J. F. Shillito	(JFS)
J.L. Gilbert	(JLG)	Edward Step	(ESt)
J. L. Henderson	(JLH)	B. Verdcourt	(BV)
		P. H. Ward	(PHW)

CIMICIDAE (Bed Bugs and Flower Bugs)

There are 30 British species and 3 alien species that comprise this family of small predacious bugs, of which 29 British and 2 alien species have been recorded in the London Area.

Temnostethus gracilis (Horv.) Sp. 187 p. 172

A rare bug occurring on lichen-covered walls and lichen encrusted trunks and branches of deciduous trees where it preys on bark-lice (*Psocoptera*) and other minute soft-bodied insects.

HERTS. Barnet, viii.1895, *EAB* (BM); and beyond the boundary at Royston, 10.vi.19, *EAB* (BM).

KENT. Westerham, 1.vii.22, ♀, *PH* (BM); Brasted, 23.vii.22, ♂, *PH* (BM); and just beyond the boundary at Sevenoaks (Knole Park), 4.vii.65, "walking" on trunk of beech tree, *KCS* (14).

*This collection consists almost exclusively of the W. West (of Greenwich) collection, all well identified to which a few only have been later added by Syms of his own collecting. Fortunately West's field-notebooks survived and Mr. Christie has kindly allowed me to go through these for London Area records. The information thus obtained and incorporated in this present paper supplements the bare records of West's given in published sources (4), (39) and (22).

SURREY. Richmond Park, 13.viii.1837, n.c. [but probably *J. O. Westward*] det. *WJLeQ* (HD); Bookham Common, 9.ix.51, *DL* det. *D. Leston* (SL); Boxhill, viii.1895, *EAB* (BM); and on the boundary at Byfleet, 8.ix.13, *EAB* (BM).

BUCKS. Beyond the boundary at Longdown Hill, 21.vii.51, *WJLeQ* (21); Chiltern Hill, viii.15, *EAB* (BM).

Temnostethus pusillus (H.-S.)

Sp. 188 p. 172

D&S p. 493

S p. 194

B p. 327 (Sp. 227)

Also rare and found in much the same situations as the previous species. Thomas (12) records it as feeding on *Psocoptera* eggs and larvae of *Psychidae* (Lepidoptera).

HERTS. Beyond the boundary at Harpenden, 15.viii.37, on *Quercus* trunk, *DCT* (12); Little Gaddesden, vii.36, on *Quercus* trunk *DCT* (12); and at Royston, *EAB* (11) and (12). [The voucher specimen for this last record is probably that in BM now identified as the previous species (*q.v.*)].

KENT. Darenth Wood, *D&S* (28) and (4); Birch Wood near Darenth, *JAP* (BM); and Hayes Common, 21.vi.30, ♂♂, *ECB* (NM) and (22).

SURREY. Purley, *D&S* (28); Redhill, *J&TL* (32); Boxhill, ix.12, beaten from ash, *WW* (60); 7.viii.37 ♀ and ♂, *ECB* (NM); Headley Lane, 13.ix.03 on ash, *WW* (60); Mickleham, *D&S* (28); *JAP* (BM); Bookham Common, viii.15, *WJA* (SL); 16.viii.48, *FJC*, det. *DL* (SL); viii and ix, *DL* (34); Claygate, *JAP* (BM); Esher, *JAP* (BM); Chobham, 4.x.36, ♂, *ECB* (NM); and beyond the boundary at Leith Hill, viii.1895, *EAB* (BM); Ewhurst, viii.1889 and viii.1896, *EAB* (BM); Shalford, viii.1886, *EAB* (BM); and Abinger, viii.1900, *EAB* (BM).

Early records of both species of *Temnostethus* need confirming.

Elatophilus nigricornis (Zett.)

Sp. 189 p. 173

S p. 195

B p. 328 (Sp. 228)

Previously only known from Scotland but within the last thirty years it has been recorded in several counties in England southwards. It occurs on established Scots pine (*Pinus sylvestris*) probably overwintering as an adult on the host tree. Rare.

HERTS. Beyond the boundary at Harpenden (Rothamsted Expt. Station), 22.viii.35, a single ♂ to light trap, "the first record south of Perth in Britain", *DCT* (12) and (BM).

SURREY. Oxshott, 2.vii.55, on lowest branch of old Scots pine, *GEW* (EMM 92, 47); and beyond the boundary at Chobham Common, 25.vi.53, on old well-grown Scots pines, *GEW* (EMM 89, 279 and 90, 205).

BUCKS. Beyond the boundary at Burnham Beeches, 30.vi.54, on old well-grown Scots pines, *GEW* (EMM 90, 205).

Anthocoris confusus (Reut.)

Sp. 190 p. 174

S p. 197

B p. 328 (Sp. 229)

Found widely distributed over the London Area where it occurs on deciduous trees (oak being the most common) and occasionally on low herbage. It has two generations a year; the overwintering adults laying their eggs in late May to early June which after hatching pass through the larval stages and are adult by early July. The progeny of this summer generation becomes adult by late August to September. Feeds on aphids and the Fruit Tree Red Spider Mite.

MIDDX. Buckingham Palace grounds, viii-ix.61, a few on birch, *TRES*' (52); St. John's Wood (Finchley Road), N.W.8, 24.vii.50, *DL* in *WJLeQ* coll. (21); Hampstead Heath, 18.vii.43, *CHA* (17); 1949, on most trees, oaks the commonest, *DL* 1/1949-50, 36-38); 5.viii.60, *DL* (HD); Ruislip Marsh, 19.vii.58, 29.vii.58 and 1.x.58, *EWG* (24) and (49); vii.64, *RAPM* (49); and Hounslow Heath, 1952, a few by sweeping vegetation at side of River Crane, *GEW* (33b).

HERTS. St. Albans, 14.iii.43, *HWJ* (43); and beyond the boundary at Harpenden, 7.ix.54 and 7.vii.55, *GGES* (HD); near Tring at Wilstone Reservoir, 18.iv.37 ♂, *ECB* (NM); Letchworth, iii.24, adults hibernating in old bird's nest, *FWE* (*Trans. Herts. N.H.S.*, 18, 132-3, 1925) (11) and (27); and Royston, 27.v.12 and 26.v.17, *EAB* (BM) and (11).

ESSEX. Epping Forest, on oak generally distributed, *CN* (35a); 7.x.62, *PSB* (16); (Wake Arms), vi.1899, *EAB* (BM); (Loughton), vii.03, *EAB* (BM); (Chingford), 25.v.10, *EAB* (BM).

KENT. Blackheath, *WW* (4); plentiful on beech hedge in garden at 63 Blackheath Park, *AAA* (EMM 94, 180) and (22); Lee, *WW* (4), (39) and (22); Kidbrook, *WW* (39); Plumstead (Wickham Lane), 15.viii.1896, on oak, and 20.ix.1894, by sweeping, *WW* (60) and (39); Shooters Hill Woods, *AAA* (22); West Wickham Wood, 1894, on alder, *WW* (60); West Wickham, 10.v.03 ♀♀, *ECB* (NM); Lewisham, *WW* (4) and (22); Bromley, vi.1881, *ES* (HD) and (37); Darenth, *GCC* (37), (4) and (22); 14.v.22, *PH* (BM); Farningham Wood, 27.v.60, ♂ in spathe of *Arum maculatum*, *EWG* (24); 14.v.61 and 5.vii.65, *KCS* (14); *AAA* (22); Shoreham, 11.ii.61, under bark, and 1.ix.61, by beating, *KCS* (14); Westerham, 25.iii.22, *PH* (BM); Eynsford, 28.ii.59, under sycamore bark, *KCS* (14); and Knockholt, 1.xii.20, *LCB* (MM).

SURREY. Richmond Park, 19.iii.05 ♀ and 18.x.03 ♀, *ECB* (NM); Wimbledon Common, 11.ii.05 ♀ and 13.v.05 ♀, *ECB* (NM); 3.viii.22, *FJC* (SL); Beddington Sewage Farm, 11.viii.55, adult and larvae, *EWG* (24); Shirley, *JAP* (BM); Chipstead, 1.v.60, *KCS* (14); Coulsdon, 19.v.06 ♀, *ECB* (NM); Banstead, 5.iv.52, on oak galls, *SW* det. *DL* (44) and (1/1952-53, 49); Banstead Downs, 5.iv.52, *SL* (1/1952-53, 73); 23.viii.55 ♀, *EWG* (24); Nonsuch Park, Cheam, 22.vii.55, *EWG* (24); Ashted, 4.vi.04, *AJC* (HD); Bookham Common, ix.1898, *WJA* (SL); iv, *DL* (34); 8.vii.56, *EWG* (24); 4.ix.65 and 9.viii.66, *PSB* (16); Effingham, 11.iv.36, on willows, *FJC* (SL); Boxhill, 27.v.16, *EAB* (BM); 22.vii.22, *FJC* (SL); 7.viii.37 ♂♂, *ECB* (NM); 4.vii.40, *FJC* (SL); 24.ix.1892, *AJC* (HD); 2.x.49, *DL* in *WJLeQ* coll. (21); Mickleham, *GCC* (37); 21.vi.03 ♂, *ECB* (NM); Ranmore Common, 10.iv.33, *FJC* (SL); Godstone (Tilburstow Hill), 7.xi.59, under flaking sycamore bark, *KCS* (14); Oxted, 11.vi.1893, *AJC* (HD); 20.viii.03 ♀, *ECB* (NM); Horsley, 1.v.04, *AJC* (HD); Esher, 17.ix.51, *FJC* (SL); Oxshott, 29.iv.33, *FJC* (SL); 11.vii.52, *FJC* (60); Ockham, 22.vii.49, *FJC* (60); Byfleet, 24.iv.17, *EAB* (BM); and beyond the boundary at Woking ix.1888, *ES* (HD); vii.1890, *ES* (BM); 24.vii.1892, *AJC* (HD); Chobham, vii.1892, *ES* (HD); n.d., *AJC* (HD); Leith Hill, 10.vi.16, *EAB* (BM); and by the Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50).

BUCKS. On the boundary at Slough (PILG), 26.vii.55, beaten from apple, *GEW* (EMM 92, 35); and beyond at Latimer, 19.vii.52 (on oak), and 20.vii.52 (on willow), *WJLeQ* (21); Chesham, 19.vii.52 (on ash and also maple), *WJLeQ* (21); Amersham, 7.vi.52, 14.ix.52 (on oak and also

elm), and 11.xi.51 (on spruce), *WJLeQ* (21); Hyde Heath, 8.iii.53, *WJLeQ* (21); Little Missenden, 13.vii.52 (on willow and also beech), *WJLeQ* (21); Jordans, 2.viii.50, *WJLeQ* (21); Coombe Hill, 21.x.62, *PSB* (16); and Chiltern Hills, viii.15, *EAB* (BM).

Anthocoris minki (Dohrn) Sp. 191 p. 175

Rare. There are as yet few certain records for this *Anthocorid* from the London area as it was only recognised in Britain in 1954 (see LeQuesne in *EMM* 90, 36-40 (1958)). It occurs more usually on ash though occasionally it has been found on wych elm and field maple. It overwinters as an adult.

KENT. Blackheath, vii and x.59, beaten from ash, *AAA* (*EMM* 96, 17) and (22).

SURREY. Boxhill, ix.59, beaten sparingly from ash, *AAA* (*EMM* 96, 17).

BUCKS. Beyond the boundary at Chesham, 6.viii.59, on hazel, *WJLeQ* (21); Little Missenden, 13.vii.52, on ash, *WJLeQ* (21); and Amersham, 4.ix.50, 14.ix.52, and 20.ix.52, on ash, *WJLeQ* (21).

Anthocoris nemoralis (Fab.) Sp. 192 p. 175

D&S p. 496

S p. 198

B p. 329 (Sp. 230)

Widely distributed and found on a variety of deciduous trees including oak, hawthorn, blackthorn, willow and apple. Like *A. confusus* it has two generations a year. More records needed from Essex.

MIDDX. Regent's Park (grounds of Zoological Gardens), 24.viii.52, in Zoo moth trap, *LCB* (MM); Palmers Green, 20.ix.20 and 29.x.18, *EAB* (BM); Hampstead Heath, 1949, on most trees, oaks commonest, *DL* (1/1949-50, 36-38); Finchley, 31.vii.43, *CHA* (17); Northwood, 13.iii.43, *PJLR* (20); Ruislip N.R., 18.vi.57, beaten from mixed *Quercus/Salix/Betula* scrub of West Thicket, *EWG* (49); 27.vi.55, *EWG* (24); 23.viii.64, *RAPM* (49); and Harefield, 22.iv.51, 8.viii.54 (on hawthorn) and 26.viii.51 (on willow), *WJLeQ* (21).

HERTS. "Widely distributed on *Quercus*, *Crataegus* and *Prunus spinosa*", *DCT* (12); West Hyde, 12.vii.52, on willow, *WJLeQ* (21); Chorley Wood, 11.viii.16, *EAB* (BM); 1.viii.54, on hawthorn, *WJLeQ* (21); Bricket Wood Common, 3.vii.56, *EWG* (24); and beyond the boundary at Herts. Beacon, xi.35, hibernating in huge numbers in *Buxus sempervirens*, *DCT* (12). [Letchworth has twice been repeated by Palmer (see published sources of records 11 and 27) as a locality for this species on the authority of a record by F. W. Edwards. However Edwards' original paper in which this appeared, namely, "Insects inhabiting bird's nests", *Trans. Herts. N.H.S.*, 18, 132-133) gives the species as *nemorum* and not *nemoralis*.]

ESSEX. Waltham Abbey (Cheshunt marsh), *AAA* (51).

KENT. Blackheath, *WW* (4); *AAA* (22); Lee, *WW* (4) and (22); Shooters Hill, *AAA* (22); Lewisham, *WW* (4) and (22); Plumstead, 24.iii.1893, *AJC* (HD); Southfleet, *AAA* (22); Ruxley Gravel pit, 3.i.65 (in grass tuft) and 29.ii.61, *KCS* (14); Farningham Wood, 23.vi.62, *KCS* (14); *AAA* (22); Fooks Cray, *KCS* (22); Bromley, vi.1881, *ES* (HD); Shoreham, *AAA* (22); and Westerham, *AAA* (22); (Tower Wood), 17.vi.51, *SL* (1/1951-52, 72).

SURREY. Kew (grounds of Royal Botanic Gardens), 10.v.66, *VFE* (BM); Wimbledon Common, *JAP* (BM); 17.iii.03, *JLH* (SL); Banstead Downs, 22.v.55, *EWG* (24); Caterham, 1890's, *AJC* (HD); Redhill, in sandy places, *J&TL* (32); Limpsfield, 10.iii.45, *CHA* (17); Ashtead Wood, 12.v.51, *SL* (1/1951-52, 69); Boxhill, various dates in August of 1936, 1937 and 1939, *ECB* (NM); Mickleham Downs, 7.x.56, *EWG* (24); Ranmore Common, 18.vi.05, *JLH* (SL); Bookham Common, 4.v.52, *DL* (54); iv and vii, *DL* (34); 21.vi.55, 10.vii.55 and 10.viii.58, *EWG* (24); 9.viii.66, *PSB* (16); Effingham, 18.iv.31, *FJC* (1/1931-32, 55); 2.iv.49, *SL* (1/1949-50, 70); Esher Common, 15.vi.58, *EWG* (24); Ockham, 7.iv.34, on willow, *SL* (1/1934-35, 8); and beyond the boundary at Woking, vii.1875, viii.1890, and ix.1888, *ES* (HD); Abinger, 12.vi.15, *EAB* (BM); and Horsley, v.27, *GVV* (BM).

BUCKS. On the boundary at Slough (ICBFS), 7.v.33 on *Crataegus oxyacanthoides*, *WHG* (41); (PILG), 26.vii.55, beaten from apple, *GEW* (EMM 92, 35); and beyond at Little Chalfont, 19.xi.51, in spruce cones, *WJLeQ* (21); Chesham, 5.ix.53, on *Salix purpurea*, *WJLeQ* (21); Amer-sham, 6.vii.52, on hawthorn, willow and hazel, *WJLeQ* (21); 18.vii.54, on *Salix alba*, *WJLeQ* (21); 14.ix.52, on elm, *WJLeQ* (21); 20.ix.52, on oak and ash, *WJLeQ* (21); Latimer, 19.vii.52, on oak, *WJLeQ* (21); and Burnham Beeches, 31.vii.54, on oak and on hawthorn, *WJLeQ* (21).

Anthocoris butleri (LeQuesne)

Sp. 193 p. 175

Local. This is a larger and stouter bug than the previous species and up until 1957 was considered only as a form of it. Its life history is similar to *nemoralis* but it is exclusively found on box (*Buxus sempervirens*). Allan (EMM 94, 180) considers it likely that *A. butleri* is predatory on *Chermes* (= *Psylla*) *buxi* Linn. (Homoptera, Sternorhyncha). He also says that a useful means of distinction between this and the last species lies in the antennae/rostrum lengths. If in the freshly caught adult specimen the rostrum is extended forward and the antennae laid in line alongside, then the tip of the former will reach (or extend just beyond) the end of the penultimate antennal segment in *nemoralis*, but will not reach the end of that segment in *butleri*.

KENT. Blackheath, circa 1927-28, a large number of larvae beaten from a low box hedge in garden at 63 Blackheath Park, *AAA* (EMM 94, 180 and 95, 96) and (22).

SURREY. Boxhill, 27.v.16, 9 and 16.vi.17, viii.1895, and 15.ix.17, *EAB* (BM); 27.ix.59, *AMM* (MM); 12.ix.53, *WJLeQ* (21); Headley Lane, vi.1894, *WW* (60).

BUCKS. Chiltern Hills, viii.15, *EAB* (BM).

[The D. C. Thomas Hertfordshire (Herts. Beacon) record under the previous species if confirmed would undoubtedly prove to be *butleri* also.—EWG.]

Anthocoris sarothamni (D&S.) Broom flower bug

Sp. 194 p. 175

D&S p. 497

S p. 199

B p. 331 (Sp. 232)

Local. This is another species that is host specific to a certain plant—in this case broom (*Sarothamnus scoparius*). It has two generations a year and overwinters as an adult. No records are as yet available for Middlesex and Essex though this species undoubtedly occurs in the London Area of both counties. The adult is best searched for by beating seeding broom in late July and August.

HERTS. Boreham Wood, 27.vi.60, *DL* (HD); and beyond the boundary at Wymondley, viii.1880, *EAB* (BM) (11) and (12).

ESSEX. Outside the boundary at Widford, nr. Chelmsford, 28.vii.60, *JHF* (42).

KENT. Lee, *TRB* (4), (39) and (22); Plumstead, 1898, *WW* (39); Darenth, 24.v.15, beating broom, *WW* (60); and Farningham Wood, 25.v.63, *PLJR* (*MM*); 5.vii.65, on broom, *KCS* (14).

SURREY. Shirley, *TRB* (37) and (3); Esher, 9.vii.51, *DL* (SL); Weybridge, *JAP* (BM); vii and viii.1893, about 30 specimens on old broom bushes, *D&S* (3) and (37); and beyond the boundary at Woking, ix.1889 *ES* (HD) and (3); and Chobham, *ES* (3); 11.vii.37 ♂♂ and ♀♀, 25.vii.34 ♀, 14.vi.36 ♀, *ECB* (NM).

BUCKS. On the boundary at Slough (ICBFS), 10 and 14.v.34, *WHG* (41); and beyond at Burnham Beeches, 24.vii.54, *WJLeQ* (21).

Anthocoris visci (Dougl.) Mistletoe flower bug Sp. 195 p. 176
S p. 149 B p. 331 (Sp. 233)

This rare bug has not yet been recorded in the London area so a search should be made on the host plant between August and October when the adults are mostly likely to be present feeding on the larvae of the Mistletoe Sucker (*Psylla visci* Linn.). Mistletoe has been reported growing on various trees (elm, poplar, lime, whitebeam, and hawthorn) in the metropolitan parts of all of the five Home Counties.

Anthocoris gallarum-ulmi (De Geer) Elm gall bug Sp. 196 p. 176
S p. 198 B p. 330 (Sp. 231)

Local. The adults most often are found on the leaves of elm on which occur their prey, the elm-currant aphid (*Eriosoma ulmi* Linn.). The presence of large numbers of these aphids feeding on the under-surfaces of the leaves cause the edges to curl and enclose them. If these are unrolled in July adult *Anthocorids* of this species are often found amongst the aphid colonies where they lay their own eggs. Leston found all stages of the bug from egg through larvae instars to adult within these elm leaf "galls" near his home in N. London (see *EMM* 90, 99-102).

MIDDX. Buckingham Palace grounds, 1962, *TRES* (1/1963 (Pt. 2), 81); N.W.8 (= St. John's Wood); 27.iv.52, *DL* in *WJLeQ* (21); adults 16.iv.52 and V instar larvae, 10.vi.52 in elm leaf galls; 27.vi.52 and 2.vii.52, all *DL* (SL) (1/1952-53, 11) and (*EMM* 88, xxxv); adults 1-7.vii.53 and eggs first and second week in June 1953, *DL* (*EMM* 90, 99); 15.vii.56, *GGES* (HD); 29.vi.60 and 31.vii.60, *DL* (HD); Palmers Green, 26.iv.09, *EAB* (BM); Enfield, vii.05, *EAB* (BM); Northwood, 21.viii.16, *EAB* (BM); Hounslow Heath, 1952, occasional on trees in the scrub vegetation, *GEW* (33b).

HERTS. Cheshunt, 8.ix.11, *EAB* (BM); and beyond the boundary at Harpenden (Rothamsted Expt. Station grounds), taken in mechanical trap, *DCT* (12); and Royston, 14.v.10, 27.v.12 and vi.08, *EAB* (BM).

ESSEX. Epping Forest (Buckhurst Hill), viii-ix.47, on Wych elm (*Ulmus montana*) around cracks in bark leading to holes of the bark beetle *Scolytus scolytus*, *JFS* (*EMM* 83, 291).

KENT. Plumstead, 15.viii.1896, *WW* (60) and (39); Lee, 1896, *WW* (39); Kidbrooke Lane, 18 and 25.vii.1896, on elm hedges, *WW* (60), (4), (39) and (22); Abbey Wood, 1896, *WW* (39); Blackheath, n.d., in garden

at 63, Blackheath Park, scarce, *AAA* (EMM 94, 100) and (22); Darenth Wood, 31.vii.09, *PH* (BM); *WW* (60); and Fawkham, 26.xii.54, *GGES* (HD).

SURREY. Forest Hill, *JAP* (BM); Wimbledon, n.d., *EAB* (BM); Caterham, *GCC* (3); Banstead Downs, 5.iv.52, under bark by the station, *SW* (44) and (1/1952-53, 73); Boxhill, vii.1900 on box (*sic*) *EAB* (BM); 27.v.16, *EAB* (BM); 5.ix.09 ♂ and ♀♀, 25.ix.10 ♂ and ♀♀, 13.viii.11 ♂ and ♀, 11.viii.34 ♂, and 14.viii.39 ♂ and ♀, *ECB* (NM); Mickleham, *GCC* (3); Oxshott, v.04, *EAB* (BM); Esher, *JAP* (BM); Surbiton, *ES* (3); viii.1892, *EAB* (BM); and beyond the boundary at Byfleet, 8.vii.50, *DL* (SL); Chobham, viii.1891, *ES* (HD) and (3); Gomshall, *ES* (3); Clandon, 21.v.60, *DL* (HD); and Farnham, 10.v.52, *WJLeQ* (21).

BUCKS. Chenies, 19.viii.16, *EAB* (BM); on the boundary at Slough (PILG), 26.vii.55, beaten from apple, *GEW* (EMM 92, 35); and beyond at Amersham, 14.ix.52, on elm and on sloe, *WJLeQ* (21); Little Chalfont, 26.viii.54, *WJLeQ* (21); Chiltern Hills, viii.15, *EAB* (BM); and Chesham, 5.ix.64, on apple, *WJLeQ* (21).

Anthocoris nemorum (Linn.) Common flower bug Sp. 197 p. 178
 D&S p. 495 S p. 199 (*A. sylvestris*)
 B p. 332 (Sp. 234)

Ubiquitous and often locally abundant on tree and shrubs; also found in fewer numbers in the flower and flower heads of various herbs. It is predatory on aphids and psyllids and has two generations a year, the second one overwintering as adult. It feeds on aphids, small lepidoptera larvae and sawfly eggs.

MIDDX. Buckingham Palace grounds, 1962 *TRES* (1/1963 (Pt. 2), 81); Cripplegate, City of London, 18.vi and 23.vii.55, adults and V instar larvae on vegetation colonising a derelict bombed site, *EWG* (25); 23.iv.55, *DGH* (57); Regent's Park, 4.vii.42, *PJLR* (20); London N.W.8 (= St. Johns Wood), 27.iv.52, *DL* in *WJLeQ* coll. (21); Hampstead Heath, 1949, on most trees, oaks commonest, *DL* (1/1949-50, 36-38); Finchley, 17.iv.43, *CHA* (17); Hammersmith, *JAP* (BM); Heston, 1939, *HStJKD* (HD); Hounslow Heath 1952, very abundant on trees, *GEW* (33b); Ickenham Golf Course Nature Reserve, 30.v.54, *EWG* (24); Ruislip L.N.R. very abundant in the Reserve, III, IV and V instar larvae of first generation taken mid-May to end of June, II, IV and V instar larvae of the second generation late July to early September, adults of the two generations overlapping for a short while in June, 1952-58, *EWG* (49).

HERTS. Barnet, viii.1885, *EAB* (BM); Boreham Wood, 27.vi.66, *DL* (HD); Bushey, 25.vii.43, *CHA* (17); Bricket Wood Common, 3.vii.56, *EWG* (24); Hatfield, 18.viii.63 and 28.iii.64, *PLJR* (MM); and beyond the boundary at Harpenden (Rothamsted Expt. Station grounds), 17.viii.37, *DCT* (12); 21.iv.53, *TRES* (1/1953-4, 4) and (EMM 89, 216); 21.vii.54, *GGES* (HD); Wymondley, viii.1880, *EAB* (BM) and (11); and Letchworth, iii.24, adults hibernating in old bird's nest, *FWE* (*Trans. Herts. N.H.S.*, 18, 132-3 (1925)); *EAB* (11).

ESSEX. Leyton, 1950, in garden, *WAS* (35b); Waltham Abbey, 16.vii.63, *PSB* (16); Epping Forest, common everywhere, *CN* (35a); 27.v.05 ♀, *ECB* (NM); 5.vii.63, *PSB* (16); (Theydon Bois), vii.22, *EAB* (BM); (Chingford), x.1890, *EAB* (BM); Benfleet, 12.xii.37, on fungus,

RWA in *SW* coll. (44); and beyond the boundary at Colchester, viii.61, *SP* (BM).

KENT. Brockley, *WW* (39); Lee, *WW* (39); Blackheath, in garden at 63 Blackheath Park, *AAA* (EMM 94, 180); Kidbrook, *WW* (39); Upper Belvedere, 23.iii.59, *RGR* (WBM); Plumstead, *WW* (39); *AAA* (22); Abbey Wood marshes, 31.viii.55, *EWG* (24); Dartford Heath, 26.iv.62, *KCS* (14) and (22); Mounts Wood, Swanscombe, 30.iv.54, *KCS* (14); Darenth Wood, 14.v.22, *PH* (BM); 27.ii.55 and 23.xii.55, *KCS* (14); Bean, 25.ix.55, *KCS* (14); Ruxley Gravel Pit, 21.i.61, 26.ii.61 and 17.iii.63, *KCS* (14); Gravesend, 21.vii.48, on willow, *TRES* (13); Foots Cry, 4.ii.62, 25.iii.62 and 15.xii.62, *KCS* (14) and (22); New Eltham, i.56, *n.c.* (BM); Elmstead Wood, 15.xi.36, larva, *SW* (44); Chislehurst Common, 16.ix.05, *HM* (1/1905-6, 52); Farningham Wood, 23.ix.51, *SL* (1/1951-52, 81); 6.iv.56, 27.iv.62, 14.v.61, 31.v.62 and 18.vi.61, *KCS* (14); 25.v.63, *PLJR* (MM); Longfield, 1.viii.64, *GGES* (46); Fawkham, 28.ii.56, *KCS* (14) and (22); Keston, 6.ix.30, larva, *RWA* in *SW* coll. (44); Hayes Common, 23.xi.63, *KCS* (14) and (48); Shoreham, 17.vii.60, *KCS* (14); Otford, 19.vii.25 ♂, *ECB* (NM); *AAA* (22); Wrotham, *KCS* (22); Polhill, 4.ii.62, under flaky sycamore bark, *KCS* (14); and on the boundary at Sevenoaks, 15.iv.22, *LCB* (MM).

SURREY. Kew (grounds of the Royal Botanic Gardens), 14.xii.58, one hibernating inside a fallen walnut at S. end of Gardens, *JLG* (7/xxiv, 1961, 169-191); Barnes, vii.65, *PSB* (16); London S.W.18 (= Wandsworth), 7.ix.58, on *Vompositae* flower heads, *MAP* (BM); Wimbledon Common, 13.v.05 ♀, *ECB* (NM); 25.vi.55, *EWG* (24); Streatham, 18.viii.62, *PSB* (16); Carshalton Beeches railway station, 25.ix.53, on *Populus*, *EWG* (24); Banstead Downs, 22.v.55 and 5.vii.57, *EWG* (24); Coulsdon, 4.iv.06 ♀ and 19.v.06 ♀, *ECB* (NM); Old Coulsdon ("Happy Valley"), 4.vii.54, *EWG* (24); Chipstead, 13.v.06 ♀ and 16.vii.11 ♂, *ECB* (NM); Redhill, in sandy places, *J&TL* (32); Leigh nr. Reigate, 5.viii.50, by sweeping, *GBR* (45); Oxted, 20.vii.03 ♀, *ECB* (NM); Godstone, 22.vi.63, *KCS* (14); Cheam (Nonsuch Park), 22.vii.55, *EWG* (24); Epsom Common, 6.ix.53, *EWG* (24); Ashted, vii.14, larvae some having the rostrum embedded in nymphs of *Phyllaphis fagi*, *ES* (1/1914-15, 100, exhibited 9.vii.14); 18.v.36, *RWA* in *SW* coll. (44); Ashted Wood, 12.v.51, *SL* (1/1951-52, 69); Oxshott Heath, 28.vii.57, *GGES* (HD); 4.viii.55, *EWG* (24); Esher Common, 4.viii.55, *EWG* (24); West End Common, 1.xi.08, *WW* (60); Ockham, 7.iv.34, on willow, *SL* (1/1934-35, 8); Mickleham Downs, 7.x.56, *EWG* (24); *JAP* (BM); Boxhill, ix.09, on ash, *WW* (60); 29.viii.37 ♂, *ECB* (NM); 30.viii.48, *FJC* (60); 17.iv.54, *SW* (44); 2.x.55, *EWG* (24); Bookham Common, ♂♂ and ♀♀ V, IV and III instar larvae from May 8 (earliest) to November 14 (latest), 1953-57, *EWG* (24); 4.ix.65, *PSB* (16); Ranmore Common n.d., *FJC* (60); 27.viii.62, *PSB* (16); and beyond the boundary at Woking, v.1888, *ES* (HD); Horsley, 1.v.04, *AJC* (HD); Gomshall, viii.1892, *EAB* (BM); Netley Heath, 8.ix.35 ♂, *ECB* (NM); Leith Hill, 21.ix.51, *SW* (44); and Horley, 10.ix.26, R. C. Hare, "said to have given him rather a severe bite" (BM).

BUCKS. Beyond the boundary at Slough (ICBFS), 8.v.34, on *Crataegus oxycanthoides*, *WHG* (41); (PILG), 26.vii.55, beaten from apple *GEW* (EMM 92, 35); Chesham, several times in 1952-53, on raspberry, *WJLeQ* (21); Hodgemoor Wood, 30.viii.52, on aspen, *WJLeQ* (21); Chiltern Hills, viii.15, *EAB* (BM); Burnham Beeches, 8.v.15, *EAB* (BM); and Coombe Hill, 7.vii.63, *PSB* (16).

Anthocoris limbatus (Fieb.)

Sp. 198 p. 179

B p. 334 (Sp. 235)

Rare. This species has been taken on only a few occasions within the London Area or near its boundary, and with the exception of possibly two records all were found some years ago. A more intensive search will probably reveal it in other localities. This *Anthocorid* occurs on *Salix* spp. where it feeds on aphids and willow flies.

HERTS. Harpenden, 5.ix.37, *BSW* (BM); 22.ix.37, *JJC* (HD); 30.viii and 27.ix.37 ♂♂ and ♀♀, *BSW* in *ECB* coll. (NM).

KENT. Shoreham, 1.ix.61, *KCS* (14).

SURREY. Byfleet, ix.12, adults and V instar larvae, *EAB* (BM) and (*Butler's Biol.*, p. 179); Woking (Woodham), ix.07, 2 ♂♂ and 2 ♀♀ beaten from sallow along banks of the Basingstoke Canal, *HASa* (EMM 43, 233); *ES* (HD); ix.08, *ES* (60) and (HD).

BUCKS. Just outside the boundary at Chesham, 19.vii.52, on willow, *WJLeQ* (21).

Tetrupleps bicuspis (H.-S.)

Sp. 199 p. 179

D&S p. 491 (*T. vittatus*) S p. 200 (*T. vittata*)

B p. 534 (Sp. 236)

Local. This bug is found on conifers particularly larch where it is predaceous in all its stages on the larch thrip, *Taeniothrips larvicivorus*. It is said to have two broods a year, the bug overwintering in the adult stage. Essex records required.

MIDDX. Hampstead, 29.vi.43, "amongst sawdust in a laboratory", *CHA* (17); and Harefield, 19.vii.60, *DL* (HD).

HERTS. Rickmansworth, 18.viii.16, *EAB* (BM); on *Larix*, *DCT* (12); Bushey, *JAP* (BM); Watford, 19.vii.60, *DL* (HD); Hatfield, ix.1891, *EAB* (BM) (11) and (12); and beyond the boundary at Northchurch, near Berkhamsted, 14.x.62, *PSB* (16); Wymondley, viii.1880, *EAB* (BM) (11) and (12); and Letchworth, *EAB* (12).

KENT. Plumstead (Bostall Wood), *WW* (4) and (22); Darenth Wood, *TRB* (4) and (22); Birchwood nr. Darenth, *JAP* (BM); Bromley, *ES* (37); West Wickham Wood, 21.ix.1895 and 8.vii.1899, on pines, *WW* (60); Farningham Wood, 6.i.60, under larch bark, *KCS* (14); and beyond the boundary at Westerham, viii.21, *PH* (BM).

SURREY. Reigate, *ES* (37); Boxhill, 13.viii.11 ♂, 8.viii.26 ♀ and 14.viii.39 ♀, *ECB* (NM); 2.x.49, *DL* (SL); on larch, *AAA* (51); Mickleham, viii.1886, *EAB* (BM); *TRB* (37); viii.15, *WJA* (SL); 9.vii.05 ♂♂ and ♀♀, *ECB* (NM); Mickleham Downs, 17.vii.48, on larch, *FJC* (SL) and (1/1948-49, 73); Headley Lane, 11.ix.04, on pines, *WW* (60); Oxshott Heath, 17.vii.60, on Scots pine, *DL* (HD); Esher Common, *JAP* (BM); 9.ix.52 and 7.x.54, *FJC* (SL); and beyond the boundary at Abinger, viii.1900, *EAB* (BM); Albury, viii.1900, *EAB* (BM); 18.vii.44 ♀♀, *ECB* (NM); Shere, viii.1892, *EAB* (BM); and Blackheath and Farley Heath, 30.viii.36, *FJC* (1/1936-37, 36).

BUCKS. Langley Park, 5.vii.56, *GEW* (40); and beyond the boundary at Amersham, 23.ix.51 and 22.x.50, on larch, *WJLeQ* (21); Penn Wood, 7.viii.54, *WJLeQ* (21); and Chiltern Hills, viii.15, *EAB* (BM).

Acomporis alpinus (Reut.) Sp. 200 p. 180

S p. 202

B p. 336 (Sp. 238)

Rare. Should be searched for by beating spruce (*Abies* spp.), Scots pine and larch at the end of July and beginning of August at which period the adults are said to be more readily found. It has not yet been recorded in the London area of Middlesex, Essex, Hertfordshire and Bucks.

HERTS. Beyond the boundary at Royston, 26.v.17, *EAB* (BM).

KENT. Southfleet, *AAA* (22).

SURREY. Esher, *GCC* (37) and (3); Ockham, 22.vii.49, *FJC* (SL); on the boundary at Wisley, v.16, beating pine *WW* (60); and beyond at Woking, vii.1890, *ES* (HD); Albury, 26.viii.43 ♂, *ECB* (NM); Leith Hill, viii.1895, *EAB* (BM); and Farley Heath, viii.1900, *EAB* (BM).

BUCKS. Beyond the boundary at Amersham, 23.ix.51, on spruce, *WJLeQ* (21) and (EMM 90, 250); and Beaconsfield, 9.viii.55, beaten in some numbers from spruce (*Abies* sp.) on outer edge of a plantation just south of the town, *GEW* (EMM 92, 47).

Acomporis pygmaeus (Fall.)

Sp. 201 p. 180

D&S p. 492 (*Temnostethus lucorum*)

S p. 201

B p. 335 (Sp. 237)

Local, though occurring in the metropolitan areas of each of the five Home counties. It is found more especially on Scots pine (*Pinus sylvestris*) although it has occasionally been recorded on other conifers. It has two generations a year; the adults of the first generation appearing about mid-June and those of the second generation in August. It feeds mainly on aphids and bark-lice.

MIDDX. Buckingham Palace grounds, 1962, a single adult of this species (normally attached to conifers) was found on oak, *TRES* (1/1963(2), 81); N. London [without further details], vii.04, *EAB* (BM); Hampstead, 8.viii.43, *CHA* (17); Hampstead Heath, 5.viii.60, *DL* (HD).

HERTS. Barnet, viii.1885, *EAB* (BM); Hatfield, 19.vii.64, *PLJR* (MM); and beyond the boundary at Berkhamsted Common, viii.36, on *Pinus sylvestris*, *DCT* (12); and Harpenden, 5.vii.54, *GGES* (HD).

ESSEX. Purfleet, *RML* (5); and beyond the boundary at Galley Wood, near Chelmsford, 1.viii.60, *JHF* (42).

KENT. Blackheath, 30.viii.36, *FJC* (SL); *AAA* (22); Plumstead (Bostall Wood), *WW* (4), (39) and (22); West Wickham Wood, vi.1894 beating pine, *WW* (SL) and (60); Eynsford, *AMM* (22); Shoreham, 1.ix.61 and 25.viii.64, *KCS* (14); Westerham, 7.vii.22, *PH* (BM); and on the boundary at Sevenoaks (Knole Park), 22.vii.61, *KCS* (14).

SURREY. Shirley, *JAP* (BM); 13.vii.12, on pines, *WW* (60); Redhill, *J&TL* (32); Boxhill, 13.viii.11 ♂♂ and ♀♀, *ECB* (NM); 9.vi.17, *EAB* (BM); 2.x.55, *EWG* (24); Oxshott Heath, 14.ix.1895, 20.ix.1894 and 28.ix.92, *AJC* (HD); *AAA* (51); 2.ix.50, *DL* (1/1950-51, 79); 13.ix.51, *FJC* (60); 17.ix.51, *FJC* (SL); 2.x.51, *HDS* (60); Esher Common, *JAP* (BM); 2.ix.30, *FJC* (SL); (Black Hills), 20.viii.52, *FJC* (SL); Weybridge, *JAP* (BM); 3.viii.19, *EAB* (BM); on the boundary at Byfleet, 15.viii.39, *FJC* (SL); 12.viii.49, *FJC* (SL); and beyond at Woking, vii.1875 and viii.1876, *ES* (HD); 3.vii.39, *FJC* (SL); Basingstoke Canal between Byfleet and Woking, 8.vii.50, abundant on pines, *SL* (1/1950-51, 73); Abinger, viii.1900, *EAB* (BM); Shere, viii.1892, *EAB* (BM); and on Blackheath and Farley Heath, 30.viii.36, *FJC* (1/1936-37, 36).

BUCKS. Beyond the boundary at Amersham, 8 and 22.x.50 and 5.vii.53, *WJLeQ* (21); Burnham Beeches, 26.vi.12, *EAB* (BM); and Chiltern Hills, viii.15, *EAB* (BM).

Orius majusculus (Reut.)

Sp. 202 p. 181

S p. 203 (*Triphleps majusculus*) B p. 337 (Sp. 240, *T. majuscula*)

Occasional though widely distributed. Found on various deciduous trees, shrubs and plants in most months of the year. It has two generations a year and overwinters as an adult (mostly the ♀♀). It feeds on aphids and mites, particularly the Fruit Tree Red Spider mite.

MIDDX. Hampstead, 12.vi.43, *CHA* (17); Hampstead Heath, 23.iv.49, by general sweeping, *DL* (SL) and (1/1949-50, 36-38); (Golders Hill), 4.vi.50, *DL* (SL); Ruislip N.R., 23.viii.64, adults taken in mixed vegetation, *RAPM* (49); Drayton, *JAP* (BM); Osterley, 16.iv.49, *BPM* in *WJLeQ* coll. (21); Hounslow Heath, 1952, on rubble tip under *Polygonum aviculare* along with *O. niger* but less common than that species, *GEW* (33b); 26.vii.53, *DL* (SL).

HERTS. Cheshunt, 29.viii.18, *EAB* (BM); Totteridge, ix.1891, *EAB* (BM); Bushey, *JAP* (BM); Hatfield, ix.1891, *EAB* (BM); and beyond the boundary at Harpenden, 5.ix.37, *HWF* (43).

ESSEX. Woodford, 28.viii.25, *EAB* (BM); and beyond the boundary at Writtle, near Chelmsford, 29.vii.60, *JHF* (42).

KENT. Blackheath, *AAA* (22); Kidbrook, *WW* (39); Birdbrook [near Kidbrook], *JAP* (BM); Lewisham, ix.11, *WW* (60), (4), (39) and (22); and Darenth, *AAA* (22).

SURREY. Banstead Downs, 5.vii.57, *EWG* (24); Claygate, *JAP* (BM); Mickleham, *JAP* (BM); Bookham Common, 15.vii.49, *FJC* (SL); 12.vi.55, 19.vii.53 and 9.viii.53, *EWG* (24); iv, vii and ix, *DL* (34); 14.viii.60, *DL* (HD); West End Common, Esher, 30.vii.51, *FJC* (SL); and beyond the boundary at Chobham, viii.06, *ES* (HD); by the Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Albury Pond, 12.v.34, *FJC* (SL); Abinger, viii.1900, *EAB* (BM); Wisley, 17.ix.05, by sweeping, *WW* (SL) and (60); and Wisley Common, 11.viii.1899, by sweeping, *WW* (60).

BUCKS. On the boundary at Slough (ICBFS), 1.x.34, two adults taken on nettles, *WHG* (41); (PILG), 26.vii.55, beaten from apple, *GEW* (EMM 92, 35); 20.vii.59, *GEW* (40); and beyond at Burnham Beeches, viii.1893, *EAB* (BM); and Chiltern Hills, *EAB* (BM).

Orius minutus (Linn.)

Sp. 203 p. 182

D&H p. 503 (*Triphleps obscurus*) and p. 504 (*T. minutus*)

S p. 204 (*T. minutus*) B p. 338 (Sp. 241, *T. minuta*)

Occasional though widely distributed. The imagines are found in similar situations as the last species during most months of the year and also overwinters in the adult state beneath bark, etc.

MIDDX. London, N.W.8 [=St. John's Wood], 3.viii.51, *DL* (SL); Finchley, 31.vii.43, *CHA* (17); Hampstead, 1.viii.43, *CHA* (17); Hampstead Heath, 1949, *DL* (1/1949-50, 36-38); and Hounslow Heath, 1953, common on the rubble tip *Polygonum aviculare* agg., *GEW* (33c).

HERTS. Cheshunt, 14.ix.12, *EAB* (BM); Broxbourne, 18.ix.09, *EAB* in *WW* coll. (60); 8.ix.10, *EAB* (BM); Rickmansworth, 15.viii.16, *EAB* (BM); Hatfield, ix.1891, *EAB* (BM); and beyond the boundary at Harpenden, 12.viii.55, *GGES* (HD).

ESSEX. Leyton, 1950, in garden, *WAS* (35b); Woodford, viii.25, *EAB* (BM); and Epping Forest (Hale End), 23.ix.23 on forget-me-not in garden, *CN* (35a).

KENT. Lee, ix, *D&S* (28), (4) and (22); Plumstead Common, ix, *D&S* (28), (4) and (22); Blackheath, 1.ix.1895, *AJC* (HD); *AAA* (22); Abbey Wood marshes, 24.vii.54 and 31.viii.55, *EWG* (24); Birch Wood [near Darenth], *JAP* (BM).

SURREY. Streatham, 18.viii.62, *PSB* (16); Wimbledon Common, 3.viii.32, *FJC* (SL); Croydon, ix, *D&S* (28); Reigate district, *J&TL* (32); Reigate, *TRB* (37); Headley Lane, *TRB* (37); Boxhill, 7.viii.37 ♀, *ECB* (NM); 6.viii.40 and 29.vii.49, *FJC* (SL); Bookham Common, vii.15, *WJA* (SL); 6.ii.40, *FJC* (SL); 22.iv.39, *FJC* (SL); 13.v.56, *EWG* (24); viii, ix and x, *DL* (34); Oxshott, 11.vii.52, *FJC* (SL); *TRB* (37); Esher Common, 17.vi.40 and 17.ix.51, *FJC* (SL); West End Common, Esher, *FJC* (SL); and on the boundary at Ockham, 22.vii.49, *FJC* (SL); Egham, 16.vi.55, *GEW* (40); and beyond at Chobham, viii.1893, ♀ on *Salix*, *ES* (BM); Byfleet, 2.vii.22, *FJC* (SL); Albury pond, 9.vi.40, *FJC* (SL); Chiddingfold, 22.viii.37, *ECB* (NM); and Abinger, viii.1900, *EAB* (BM).

BUCKS. On the boundary at Datchet, 15.vi.54, *GEW* (40); Stoke Common, 12.ix.64, *WJLeQ* (21); Slough (ICBFS), 8.v.34, on *Salix alba*, and 15.vi.34, on *Erigeron* sp., *WHG* (41); (PILG), 26.vii.55, beaten from apple, *GEW* (EMM 92, 35); and beyond at Hodgemoor Wood, 11.v.51, *WJLeQ* (21); Little Chalfont, 11.x.51, *WJLeQ* (21); and Amersham, 12.vii.52, on maple, *WJLeQ* (21).

Orius niger subsp. *compressicornis* (Sahl.) Sp. 204 p. 182

D&S p. 502 (*Triphleps niger*) S p. 203 (*T. niger*)

B p. 336 (Sp. 239, *T. nigra*)

Local. Although said to be especially associated with the heaths (*Erica* spp.) and heather (*Calluna vulgaris*) it has been found on a variety of other plants of which Stinking Mayweed (*Anthemis cotula*) and Mugwort (*Artemisia vulgaris*) seem the most favoured. It probably has two generations.

MIDDX. Buckingham Palace grounds, 1962, one specimen by beating trees, *TRES* (1/1963(2), 81); Cripplegate, City of London, 18.vi.55, swept from *Artemisia vulgaris* colonizing a corner of a derelict bombed site, *EWG* (25); Mill Hill, 24.x.37, *KG** (SL); Finchley Road, N.W.8, 1.vii.50, *DL* (SL); Hampstead Heath (Ken Wood), 1.x.49, *DL* (SL) and (1/1949-50, 36-38); Hammersmith, 13.viii.65, *PSB* (16); Hounslow Heath, 1952, common on rubble tip under *Polygonum aviculare*, *GEW* (33b); 9.viii.53, *DL* (SL).

HERTS. St. Albans, 29.viii.64, *PLJR* (MM).

ESSEX. Leyton, 1950, in garden, *WAS* (35b); and beyond the boundary at Benfleet, 15.ix.57, *DL* (SL).

KENT. Birdbrook [near Kidbrook], *JAP* (BM); Plumstead, *AAA* (22); Plumstead Common, *WW* (4) and (39); Blackheath, *AAA* (22); Abbey Wood marshes [=Erith Marshes], 24.vii.54 and 31.viii.55, *EWG* (24); Dartford, 12.vii.03, *WW* (60); Southfleet, *AMM* (22); Keston, *AMM* (22); Otford, 30.ix.22, *PH* (BM); *AAA* (22); Eynsford, 15.viii.37, *SL*

*In spite of considerable searching these initials remain unidentified as to their owner.

(1/1937-38, 50); and just beyond the boundary at Gravesend, *JAP* (BM); Gravesend district, 23.xi.30 ♀, *ECB* (BM); Gravesend (Milton), 30.vi.03, on banks of Thames by sweeping, *WW* (60); Gravesend marshes, *ECB* (22).

SURREY. Shirley, n.d. [but prior to 1893], *WW* (60); Shirley Common, 10.ix.1898 and 16.ix.14, sweeping heath, *WW* (60); Addington Hills, *D&S* (27); Ashted, 10.ix.47 and 13.ix.48, *FJC* (SL); Headley Lane, 7.ix.35 ♂, *ECB* (NM); Boxhill, 29.vii.49, *FJC* (SL); Oxshott, *TRB* (37); 5.ii.03 ♀, *ECB* (NM); 28.vii.51, *DL* (SL); Esher, *JAP* (BM); Arbrook, 7.ix.48, *FJC* (SL); Weybridge, vi, not rare, *JAP* (28) and (BM); ix, on flowers of *Ulex nanus*, *D&S* (28); and beyond the boundary at Woking, vii.1890 and ix.1880, *ES* (HD); ix.1890, *AJC* (HD); Chobham, vi and vii.1892, *ES* (HD); 1.ix.35 ♂, 19.ix.39 ♂♂, and 4.x.36 ♂ and ♀♀, *ECB* (NM); Chobham Common, 20.vi.25, on *Cuscuta*, *HStJKD* (HD); Gomshall, viii.1892, *EAB* (BM); Albury Heath, viii.1892, *EAB* (BM); and Netley Heath, 8.ix.35 ♂, *ECB* (NM).

BUCKS. On the boundary at Slough (ICBFS), 18.viii.31, a ♂ collected on *Calystegia sepium*, and 8.viii.31 on *Sisymbrium officinale*, *WHG* (41); (PILG), 20.vi.58, *GEW* (40).

Orius laevigatus (Fieb.)

Sp. 205 p. 184

Rare. Taken by sweeping flowers along hedgebanks and open hill-sides in late summer and autumn, or by searching individual flower heads of poppy, stinking mayweed and mullein. Not yet recorded from Herts., Essex or Bucks.

MIDDX. Finchley, 22.vii.44, *CHA* (17) and (EMM 81, 163-4); Hampstead, 22.vii.44, *CHA* (17); and Hounslow Heath, 1952, frequent on rubble tip, *GEW* (33b).

KENT. Birch Wood [near Darenth], ♀, *JAP* (BM); Blackheath, 1958, in garden at 63 Blackheath Park, *AAA* (EMM 95, 96); Keston, *AMM* (22); and on the boundary at Sevenoaks, *AMM* (22).

SURREY. Bookham Common, ix and x, *DL* (34); Boxhill, 26.vi.39, *FJC* (SL); 2.x.49, *DL* (SL); and beyond the boundary at Ash Vale, 4.ix.49, *DL* (SL); and Netley Heath, 8.ix.35 ♀, *ECB* (NM).

Lasiochilus sladeri (Distant)

Foreign species

p. 197

This alien species, native to the islands in the S.W. Indian Ocean (Seychelles and Rodriguez) and possibly E. Africa, has been reported in this country on a few occasions when it has turned up in stored products in dockside warehouses. It is predatory on insects that infest the stored products. It was first recorded in the London Area in the autumn of 1955 when two adults were found in a garden at Blackheath—less than three miles from the docks at Greenwich, the likely source of introduction. No further records have been made either at Blackheath or nearby that might indicate that the species had established itself.

KENT. Blackheath, 30.ix.55, in garden at 63 Blackheath Park, in dead grass and vegetable debris, *AAA* (EMM 92, 229-230) and (Southwood and Leston, *Land and Water Bugs*, p. 197).

Lycocoris campestris (Fab.)

Debris bug

Sp. 206 p. 184

D&S p. 499 (*L. domesticus*)

S p. 191

B p. 323 (Sp. 223)

Local though widely spread. This bug is not only predatory on insects and mites which occur in granaries, stables and outhouses, fowl houses,

haystacks, and in ditch debris but it also occasionally sucks blood of warm-blooded animals such as the young at roost in chicken and pigeon coops and wild birds in the nest. It has also been known to inflict small red swellings on the skin in man where it penetrates the epidermis with its rostrum.

MIDDX. High Holborn, London, W.C.1, 14.ii.05, in granary, *HStJKD* (HD); *AJC* (HD); Hampton, 25.vii.33, *FJC* (SL); Finchley, 22.viii.43, *CHA* (17); and Uxbridge, 28.viii.35, in chicken coop in company with *Xylocoris ater* and many mites, *DCT* (33a).

HERTS. West Hyde, 19.v.56, V instar larva in old bird's nest in holly tree by Springwell gravel pits, *EWG* (24); Lea Valley, 30.i.49, V instar larva, *RDW* (SL); Boxmoor, near St. Albans, 3.vii.46, in hay manure heap in small orchard in Green End Road, *BV* (EMM 85, 249-253); Hatfield, ix.1891, *EAB* (BM); and beyond the boundary at Wymondley, *EAB* (11); Letchworth, 10.iv.14, *EAB* (BM); iii.24, adults hibernating in old bird's nest, *FWE* (11), (27) and (*Trans. Herts. N.H.S.*, 18, 132-8, 1925); Royston, vi.03, *EAB* (BM) and (11); "abundant and widely distributed in haystacks, bird's nests, chicken and pigeon coops. Will feed on Acarines. Hibernates as imago and in late nymphal instars", *DCT* (12).

ESSEX. Epping Forest (High Beach), v.06, *CN* (35a).

KENT. Kidbrook, 22.v.12, in haystack refuse, *WW* (60), (4), (39) and (22); Blackheath, *AAA* (22); Eltham Well Hall (Kidbrook Lane), 18.vii.-1896, *WW* (60); Lewisham (Hither Green Lane), 5.ix.1896, in haystacks, *WW* (60); Stone, near Dartford, 26.xii.56, in decaying fungus on elm, *KCS* (14); Southfleet, *AMM* (22); West Wickham, 10.v.03 ♂, *ECB* (NM); Ash, N.W. of Wrotham, *AAA* (22); Brasted, 2.iii.35 ♀, *ECB* (NM); Westerham, 25.iii.22, *PH* (BM); and on the boundary at Gravesend, *JAP* (BM).

SURREY. Southwark (Guy's Hospital), 1919 ♂, *ECB* (NM); Richmond Park, 14.ix.49 and 15.x.41, *FJC* (SL); Putney, 28.ii.27, in a room in house at 19 Haslewell Road, *HSJKD* (HD); Wimbledon Common, 6.viii.-41, *FJC* (SL); Merton Park, 15.ix.40, *FJC* (SL); Shirley, 15.iv.05 ♂, *ECB* (NM); Shirley Common, 1.v.1897, on pine, *WW* (SL); Buckland Hill, 16.v.05 ♀, *ECB* (NM); near Reigate at Redstone and Colley farms, at bottom of haystacks, *J&TL* (32); Oxted, 11.vi.1893, *AJC* (HD); Ashted, 13.ix.48, *FJC* (SL); Leatherhead, 1911, *WJA* (SL); Bookham Common, 6.viii.1895, beating pine, *WW* (SL); viii, *DL* (34); Oxshott, 6.ix.1896, *WJA* (SL); Headley Lane, 28.v.05, *AJC* (HD); Ranmore, ix.1899, *EAB* (BM); and beyond the boundary at Chobham, vi.1876, *ES* (HD); vii.1880, *ES* (HD); x.1898, *AJC* (HD); Chobham Common, 29.vi.25, *HStJKD* (HD); Camberley, 4.x.47, *LCB* (MM); and Albury, 19.ix.34, *FJC* (SL).

BUCKS. On the boundary at Slough (ICBFS), 6.vi.33, a ♂ collected in a ditch, *WHG* (41); (PILG), 24.vii.59, *GEW* (40); and beyond at Little Chalfont, 11.vii.56, 24.ix.54 and 16.xi.54, *WJLeQ* (21).

Xylocoris galactinus (Fieb.) Hotbed bug Sp. 207 p. 185
D&S p. 500 (*Piezostethus galactinus*) S p. 193 (*P. galactinus*)
B p. 324 (Sp. 224, *P. galactinus*)

Local though not rare. Found in hot beds, manure heaps, and in stable straw, wherever the temperature is relatively high. It overwinters as an adult.

MIDDX. Highgate, 14.viii.49, *CHA* (17); and Mill Hill, 23.ix.16, *EAB* (BM).

HERTS. Cheshunt, 13.ix.15, *EAB* (BM); and beyond the boundary at Harpenden, 11.viii.37, in ivy under *Tilia*, *DCT* (12).

ESSEX. Canning Town, *TRB* (37); Waltham Abbey, 12.ix.10, *EAB* (BM); and beyond the boundary at Takeley, east of Bishop's Stortford, 2.x.10, *PH* (BM).

KENT. Blackheath, *AAA* (22); Lewisham (Southend), 2.x.1895, in stable refuse, *WW* (60), (SL), (39), (3) and (22); Plumstead Marshes, 1.ix.03 ♂♂ and ♀♀, *ECB* (NM), (38) and (22); Darenth Wood, 27.viii.05, *WW* (60); Otford, 16.vii.22, *PH* (BM); and Westerham, 15.viii.22, *PH* (BM).

SURREY. Dulwich, *TRB* (37); Wimbledon, *JAP* (BM); Wimbledon Common, 6.viii.41, *FJC* (SL); Shirley, 8.vi.07 ♂♂ and ♀♀, *ECB* (NM); Reigate, *ES* (37) and (3); Boxhill, 29.viii.37 ♀, *ECB* (NM); Ashtead, 13.ix.48, *FJC* (SL); 25.ix.48, *DL* (SL); Bookham Common, 1.ix.62, *KCS* (14); Black Hills, Esher, 29.vi.53, and 7.x.52, *FJC* (BM); Esher Common, 29.vi.53, *FJC* (SL); West End Common, Esher, 30.vii.51 and 18.vi.51, *FJC* (SL); and beyond the boundary at Woking, ix.1889, *ES* (HD) and (3); 13.iv.49, *FJC* (SL); Albury, *EAB* (3); and Ewhurst, viii.1890, *EAB* (BM) and (3).

BUCKS. On the boundary at Slough (PILG), 24.vii.59, in litter, *GEW* (40); between Amersham and Aylesbury, 20.viii.55, on a 359 bus, *WJLeQ* (21); and Chiltern Hills, viii.15, *EAB* (BM).

Xylocoris cursitans (Fall.)

Sp. 208 p. 185

D&S p. 501 (*Piezostethus rufipennis*) S p. 193 (*P. cursitans*)

B p. 325 (Sp. 225, *P. cursitans*)

Occasional. Found beneath the bark of various deciduous trees such as oak, beech, elm, lime, elder, and apple, and on fallen logs. It feeds on *Collembola*, thrips, and eggs of small sub-cortical insects and invertebrates. The adults which may best be found from late June to September are most often brachypterous but the macropterous form is not uncommon.

MIDDX. Enfield, 26.viii.04 ♀, *ECB* (NM); and Northwood, 15.x.43, *PJLR* (20).

HERTS. Hatfield, 19.vii.64, 4.viii.63 and 27.ix.64, *PLJR* (MM); and beyond the boundary at Letchworth, 1.iv.18, *EAB* (BM), (11) and (12).

ESSEX. Epping Forest, 22.ix.17, adults and V instar larvae, *EAB* (BM); 1.viii.42, *PJLR* (20); 29.iv.60, *KCS* (14); 15.viii.64, *PJLR* (MM); (Loughton), *GCC* (37), (5) and (35a); vii.03 and 3.vii.15, *EAB* (BM); (Fairmead), under bark, *CN* (35a); (Monk Wood), *CN* (35a); (Chingford), 15.vi.52. V and IV instar larvae, *EAB* (BM).

KENT. Blackheath, *AAA* (22); Bexley (Joyden's Wood), 25.ix.60, *KCS* (14); Westerham, 1 and 2.vii.22, 17.viii.22 and 15.ix.21, *PH* (BM); 28.vi.25 ♀, *ECB* (NM); 28.iv.60 and 25.vii.59, *KCS* (14); and on the boundary at Sevenoaks (Knole Park), 4.vii.65, *KCS* (14).

SURREY. Coulsdon Common, 13.vi.09 ♀, *ECB* (NM); Reigate, *ES* (37) and (3); Reigate district, *J&TL* (32); Headley Lane, *TRB* (37) and (3); Mickleham, *JAP* (BM); 9.iv.31, *FJC* (SL); Mickleham Downs, 4.ii.27, *FJC* (SL); Boxhill, 22.vi.19 ♂, *ECB* (NM); 1.x.55, *DL* (SL); Ranmore, 15.vii.40, *FJC* (SL); Ashtead, 9.iv.49, *DL* (SL); Bookham Common, 21.vi.55, adult and two larvae beneath bark of fallen oak trunk near Hollow Path, *EWG* (2/37, 57) and (24); Oxshott Common, 24.iv.54, under bark of cut log, *DL* (SL) and (1/1954-55, 78); Esher Common,

30.iv.51, *FJC* (SL); Weybridge, *TRB* (37) and (3); *JAP* (BM); and beyond the boundary at Chobham, *TRB* (3); Gomshall, viii.1900, *EAB* (BM) and (3); Godalming (Cut Mill), 27.iii.21, *G. C. B. Leman* in *HStJKD* coll. (HD); and Chiddingfold, 1898, *HStJKD* (HD).

BUCKS. Beyond the boundary at Jordans, 6.viii.50, *DL* (SL); and Burnham Beeches, n.d., n.c. (26).

Xylocoris formicetorum (Boh.) Sp. 209 p. 186

S p. 194 (*Piezostethus formicetorum*)

B p. 326 (Sp. 226, *P. formicetorum*)

Rare. Found within the nest of the Wood Ant (*Formica ruba*) and is obtained by sifting through the pine needles and sticks which constitute the nest. In the London Area it is only known from as yet one locality in Kent. Similar situations in other counties where nests of the host occur should be searched from July-October, when *X. formicetorum* has been found as adult.

KENT. Westerham, 10.ix.21 (BM) and 16.x.21 (BM) and (NM), adults and larvae, *PH* (22) and (10); 11.iii.22, 18.vii.22 and 26.viii.22, *PH* (BM); ix.21, at same locality, a few larvae, *HStJKD* (10).

Xylocoris flavipes (Reut.) Foreign species p. 197

This foreign *Xylocoris* has been recorded on a few occasions in this country introduced with imported wheat flour and grain, and rice where it preys upon larvae of insects which infest these stored products. Like the alien *Lasiochilus sladeri* dealt with on p. 95(104) it sometimes wanders from its original place of introduction and may then be found some distance away.

ESSEX. Wapping (Metro Warf), 4.iv.28, n.c. (BM); Millwall Docks, 1951, n.c. (SL).

[Middx. and Surrey are given in the list of counties where this alien has been reported, in Masseur's County Distribution list of British Hemiptera-Heteroptera (EMM 91, 7-27) and by Southwood and Leston, *Land and Water Bugs*, p. 197, but both are without further provenance.—EWG.]

Bracysteles parvicornis (Costa) Sp. 210 p. 186

D&S p. 506 (*B. pilicornis*)

S p. 205

B p. 339 (Sp. 242)

Rare. This small bug has only once been found in the London Area. It occurs at the roots of grasses in dry situations, such as hillsides and downland, and at the bases of sedges and rushes in damper situations. It is said to overwinter in the adult state beneath bark.

KENT. Westerham, ii.21, *PH* (BM).

Cardiastethus fasciventris (Garb.) Sp. 211 p. 186

D&S p. 507 (*C. testaceus*)

S p. 206

B p. 339 (Sp. 243)

Rare. This small bug has been found on various conifers (*Pinus sylvestris* and *Picea* spp.) and small deciduous trees e.g. sloe and hawthorn more especially if lichen covered. The adults are found from late July onwards and overwinter beneath bark and under litter.

KENT. Just outside the boundary at Ryarsh, *AMM* (22).

SURREY. Coulsdon, 27.viii.30, *ECB* (NM); Buckland Hill, 7.v.05, *ECB* (NM); Headley Lane, 4.v.04, sweeping near larch, *WW* (60); Boxhill, 1903, rare, *WW* (1/1903, 66); 4.vi.05, by sweeping, *WW* (60); x.09 and ix.12, *WW* (60); 3.x.37, on spruce, *AMM* in *EWG* coll. (24) and (MM); 4.ix.37, *AMM* (SL); and beyond the boundary at Horsell, *ES* (36); and Chobham, viii.1872, *ES* (HD) and (36).

Xylocoridea brevipennis (Reut.)
B p. 340 (Sp. 244)

Sp. 212 p. 187

Rare. This species occurs beneath the loose bark of conifers and deciduous trees such as lime, apple and hawthorn. It has, however, only been recorded from one locality in the London Area and that was nearly 70 years ago. Elsewhere the adults have been found from February to April and also in September, and have save for one exception, all been brachypterous.

SURREY. Richmond Park, 2.iii.1898, three specimens under bark of hawthorn bushes, *CM* (3), (38) and (*EMM* 34, 215).

[It has been taken comparatively recently beyond the Surrey boundary at Silwood Park, near Ascot, Berks., under sycamore bark, *N. H. Anderson*, 28.x.58, in *WJLeQ* coll. (21)]

Dufouriellus ater (Dufour)
D&S p. 508 (*Xylocoris ater*)
B p. 341 (Sp. 245, *X. ater*)

Sp. 213 p. 187
S p. 207 (*X. ater*)

Rare. Similar to the previous species in form and in colour, and is also found beneath bark, though throughout all months of the year. Occurs on conifers such as larch and on apple and pear.

MIDDX. South Kensington, 4th Floor Entomological Block, Natural History Museum, 4.ix.49, 2.xi.49 and 11.iv.50, *IFL* (BM); Hampstead, 11.x.45, on roof of a building, *CHA* (17); Hillingdon, 2.iv.33, under pine bark, *DCT* (33a); Uxbridge, 28.viii.35, in chicken coop in company with *Lyctocoris campestris* and many mites, *DCT* (33a).

HERTS. Beyond the boundary at Ashridge, vii.36, under oak bark, *DCT* (12).

ESSEX. Epping Forest (Fairmead) 18.ix.15, under bark, *CN* (35a); (Chingford), 18.ix.15, *EAB* (BM).

KENT. Brockley, 1902, *WW* (39); Blackheath, viii.55, larvae at the beginning, and adults towards the end, of the month, in garden at 63 Blackheath Park under chips of bark on the trunk of a dead Williams pear tree infected with the brocket fungus, *Polystictus versicolor*, also under dry bark on a post forming part of a rose arch, *AAA* (*EMM* 95, 96) and (22).

SURREY. Richmond, *GCC* (3); Sydenham, 3.v.1830, *Hope-Westward* coll. (HD); Caterham, *GCC* (37) and (3); Reigate, *ES* (3); *WB* (37); Esher Common, *JAP* (BM); beneath bark of post, *AAA* (51); and beyond the boundary at Horsell, *JAP* (BM); and Chobham, *ES* (HD) and (3).

BUCKS. Langley, 5.v.56, *GEW* (40); and on the boundary at Slough (*ICBFS*), 7.ix.34, collected on cabbage, *WHG* (41); (*PILG*), 10.iii.57, in beehive under bark, *GEW* (40).

Oeciacus hirundinis (Jenyns) Martin bug Sp. 214 p. 187
 D&S p. 511 (*Acanthia hirundinis*) S p. 187 (*Cimex hirundinis*)
 B p. 321 (Sp. 222 *C. hirundinis*)

Rare, though where found it is sometimes locally abundant. Occurs in the nests of House-martins throughout the summer months that these migrant birds are with us. Both larvae and adults are ectoparasitic on the host. In autumn when the birds migrate the bugs leave the nest (usually built in eaves of buildings) and retire to nearby crevices in brick and woodwork. Here they remain in a state of torpidity until their hosts return the following Spring to reoccupy the nesting sites.

MIDDX. Mill Hill, vi.34, in house, n.c. (BM); Stanmore, 26.iv.34, infesting cottage, n.c. (BM).

KENT. Brasted, N.W. of Westerham, 20.ii.35, *PH* (BM); 1.iii.35, *PH* (BM); 1.iii.35, *AMM* (MM); 2.iii.35 ♂♂ and ♀♀, *ECB* (NM); vi.35, in martin's nest, *AMM* in *EWG* coll. (24); Chipstead, N.W. of Westerham, i.42, *PH* (BM).

SURREY. Chobham, viii.1876, a good series swarming on window near martin's nest under eaves of a house, *ES* (HD), (38), (3) and *ES* in *EAB* coll. (BM).

BUCKS. On the boundary at Slough (ICBFS), 9.vi.31, collected in sparrow's nest in old martin's nesting site, *WHG* (41); (PILG), various dates, *GEW*.

Cimex lectularius (Linn.) ssp. *lectularius* Bed bug Sp. 215a p. 188
 D&S p. 510 pars (*Acanthia lectularia*) S p. 186 (*Cimex lectularius*)
 B p. 310 (Sp. 219, *Cimex lectularius*)

The bed bug is nocturnal in habit spending the daytime in cracks in walls, beneath skirting boards, behind wallpaper, and in corners of mattresses and beds, etc., in rooms used by man for sleeping quarters, coming out at night in search of a blood meal from its host. In spite of generally improved living conditions nowadays the bed bug is still present in slums and other unhygienic dwellings throughout the London Area. The paucity of available records is however due, in the main, to the reluctance with which the presence of the bug is declared or admitted by the owners of such properties to the Public Health authorities. Indeed the records given below mostly represent Museum material and do not include reported cases of the bug from local Medical Officer of Healths' files.

MIDDX. Fleet Street, 4.vi.02 ♂, *ECB* coll. (NM); St. George's Hospital, Hyde Park Corner, S.W.1, 11.vi.38, found in a woman's ear, (BM); Paddington Infirmary, x.11, *F. Noad Clark* (1/1911-12, 93-4); Highgate, ix.38, *FDB* (SL); Hampstead, vi.29, in animal houses, *EAB* coll. (BM). There are also several other specimens no further localised than "London" in (BM) and (SL).

HERTS. Just beyond the boundary at Harpenden, *HFB* (12); and beyond at Letchworth, *RP* (11), (12) and (27); Knebworth, *RP* (11), (12) and (27); and Royston, v.20, *Lady Knutsford* (BM).

KENT. Greenwich, 1897, *WW* (60), (4) and (22); Woolwich, 5.v.04, *ECB* (NM) and (22); 25.ii.26, *PH* (BM); 3.iii.35, *AMM* in *EWG* coll. (24); 3.xi.39, *AMM* (MM); Lewisham, 20.iv.01, *WW* (SL); St. Paul's Cray, vii.63, on bedroom wall, *K. Lawrence* (BM); Dartford, 23.ix.59, *KCS* (14); and on the boundary at Sevenoaks, *AAA* (22).

SURREY. Brixton, vii.30, *HStJKD* (HD); Streatham, vi.02, *FJC* (SL); Kingston, v.38, *AEG* (MM); and Leatherhead, vii.15, *FJC* (SL).

BUCKS. Slough, 14.viii.35, *AMM* (MM); Colnbrook Hostel, ix.59, *GEW* (40).

Cimex lectularius Linn. ssp. *columbarius* (Jenyns) Pigeon bug
D&S p. 510 pars (*Acanthia columbaria*) Sp. 215b p. 191
S p. 187 (*Cimex columbaria*) B p. 319 (Sp. 220 *C. columbarius*)

At one time the pigeon bug was considered a separate species but modern work has shown that the characters used to distinguish it from those of *lectularius* do not now warrant its recognition higher than at subspecific rank. It is much less common than formerly owing to the decline in popularity of keeping pigeons in cotes; roosts in churches and around buildings seem not to become infested. The bug is also occasionally found in fowl-houses. There are at present no records available for the London Area though it probably still occurs within our boundary.

Cimex pipistrelli (Jenyns) Bat bug Sp. 216 p. 191
D&S p. 512 (*Acanthia pipistrelli*) S p. 188
B p. 320 (Sp. 221 and 221a, *C. dissimilis*)

Rare. This bug has been recorded from the roosts of three British species of bat, namely, the pipistrelle or long eared bat, the noctule and the serotine. Few London Area records are at present available and no opportunity should be lost in examining any bat roosts for this and other species of ectoparasites.

HERTS. Beyond the boundary at Royston, v.20, *Lady Knutsford* in *EAB* coll. (BM), (11), (27) and (12).

ESSEX. Wanstead Park, 10.xi.52, several adults and V instar larvae were found in a hollow fallen elm, *EES* (60) (SL) in *SW* coll. (44); in *WJLeQ* coll. (21) (1/1952-53, 57) and (EMM 89, 72). Five adults (1 ♂ and 4 ♀♀) were given by Mr. Syms to Dr. T. R. E. Southwood at Rothamsted Expt. Station who got them to feed on the warmed skin of his arm. Later a large number of eggs were laid and the majority were hatched to be subsequently reared successfully through to final moult (EMM 90, 35).

BUCKS. On the boundary at Slough, 27.vii.54, a small number of adults were found with other insects and mites in a pipistrelle's roost under the eaves of a house, *GEW* (40) and (EMM 92, 138-41). [The four specimens mentioned in the EMM paper that were identified as *Cimex dissimilis* have since proved to be only *pipistrelli*. *C. dissimilis* is not regarded as British—see text under next species.—EWG.]

Cimex dissimilis (Horv.) Sp. 217 p. 191

A small number of *Cimex* bugs occurring with other insects and mites in a pipistrelle bat's roost and its debris (consisting almost entirely of excrement) located under the eaves of a dwelling house at Slough, Bucks., were found by Mr. G. E. Woodroffe in July 1954 (Woodroffe, 1956, EMM 92, 138-141). These bugs consisted of *Cimex pipistrelli* Jen. except for four examples which were later identified by Dr. W. E. China as *C. dissimilis* (Woodroffe, *loc. cit.* and Southwood and Leston, *Land and Water Bugs*, 1959, p. 191-2).

Subsequently Mr. I. Lansbury of the Hope Dept. of Entomology, Oxford compared these Buckinghamshire specimens with some authentic Continental *dissimilis* from Bamberg, S. Germany and found that the two sets of material did not agree. He then borrowed Horváth's type of *dissimilis* (described in *Ann. Mus. Hung.*, 8, 361, 1910 and based on a specimen collected at Csép in Central Hungary by F. Cerva, now in the National Museum at Budapest) and confirmed that Woodroffe's specimens were not the same and were, in fact, only *pipistrelli* (Lansbury, 1961 *Entomol.*, 93, 133-34).

Material substantiating the two earlier British *dissimilis* records from Oxfordshire and Hampshire cited by E. A. Butler (1923, *A Biology of the British Hemiptera-Heteroptera*, p. 320-21) is in the entomological collections at the British Museum (Natural History). Dr. W. E. China of the Museum's Department of Entomology compared this material against Horváth's type. In a private communication to Mr. Lansbury (Lansbury, *loc. cit.*) Dr. China said that he found that the Oxfordshire specimens (coll. H. Britten at Thame Park, 24.iv.16 ♂ and ♀, det. as *dissimilis* by E. A. Butler) were certainly only *pipistrelli*, whilst that from Hampshire (coll. Rev. H. S. Graham in the New Forest, n.d., previously identified as *dissimilis* by Dr. K. Jordan) was also referable to *pipistrelli* or at most a form of it.

Lansbury thus concluded (Lansbury, *loc. cit.*) that as there appeared to be no authenticated records for *Cimex dissimilis* in this country, it should no longer be considered a British species. This conclusion confirms an earlier held view of China (1943, *The Generic names of British Insects, Pt. 8. The British Hemiptera-Heteroptera*, p. 251, note 2) and re-iterated by E. C. Bedwell (1945, *EMM* 81, 243-273) that on critical investigation this might prove to be the case.

MICROPHYSIDAE (Minute Bugs)

This small family of tiny bugs contains 7 British species, 5 of which have been found in the London Area.

Loricula pselaphiformis (Curtis)

Sp. 218 p. 192

D&S p. 487 (*Zygonotus pselaphiformis*)

S p. 208 (*Microphysa pselaphiformis*)

B p. 341 (Sp. 246 *M. pselaphiformis*)

Local. This species has been found on the trunks of various deciduous trees e.g. beech, walnut, lime, horsechestnut, birch and hawthorn especially if lichen covered. It stalks up and down on the bark in search of its prey which is said to be minute insects (e.g. bark lice and *Collembola*) and mites that live within the crevices. The adults have been taken in late June, July and August. Records for Herts. and Bucks. required.

MIDDX. Potters Bar, 11.vi.13 ♂ and ♀, *ECB* (NM).

HERTS. Just outside the boundary at Harpenden, 8.viii.37, on *Aesculus* trunk, *DCT* (12); and beyond at Little Gaddesden, viii.36 on trunk of *Juglans*, *DCT* (12); and Royston, vi.08, *EAB* (BM), (11) and (12).

ESSEX. Epping Forest (Fairmead), ♀ only on hawthorn, *CN* (35a); (Chingford), vii.1892, *EAB* (BM).

KENT. Lee, under bark and on palings, *D&S* (28), (4) and (22); Darenth, in old hedges, *D&S* (28), (4) and (22); *JAP* (BM); Birchwood,

JAP (BM); Bromley, vi.1887, *ES* (HD), (37), (4) and (22); and on the boundary at Sevenoaks, *AMM* (22); (Knole Park), 4.vii.65, *KCS* (14).

SURREY. Coombe Wood, *ES* (3); Croydon, under bark and on palings, *D&S* (28) and (3); Reigate, *ES* (37) and (3); Redhill, *J&TL* (32); Boxhill, on *Buxus sempervirens*, *D&S* (28) and (3); Ranmore Common, 28.vi.14, sweeping in field, *WW* (60); Weybridge, *JAP* (BM); on the boundary at Byfleet, 19.vi.15, *EAB* (BM); and beyond at Woking, vii.1890 and vi.1892, *ES* (HD) and (3); Horsell, *JAP* (BM); Chobham, vii.1877, *ES* (HD); Ewhurst, viii.1889, *EAB* (BM) and (3); Abinger, 12.vi.15, *EAB* (BM); and Shere, viii.1892, *EAB* (BM) and (3).

BUCKS. Beyond the boundary at Amersham, 2.vii.51 ♂, "on my supper plate! presumably from old lichen-covered apple trees in the garden", *WJLeQ* (21) and (EMM 90, 250); and Burnham Beeches, 24.vii.54, *WJLeQ* (21).

Loricula elegantula (Baerensprung)

Sp. 219 p. 193

D&S p. 488 (*Zygonotus elegantulus*)

S p. 208 (*Microphysa elegantula*)

B p. 342 (Sp. 247, *M. elegantula*)

Local. This species is found on lichen covered trunks of both deciduous trees and conifers. The adults are found from mid-July onwards. Both larvae and adults are predatory on mites, springtails and other small inhabitants of tree bark. Douglas and Scott (28) writing in 1865, just over 100 years ago, said that this species was "abundant in some years at the end of June on trunks of trees and old palings in the London district". It cannot be said to be ever abundant in the area now.

MIDDX. Enfield, 1.viii.08 ♀♀, *ECB* (NM); Ruislip N.R., 18.vii.64, on birch though only ♀♀ present, *RAPM* (49).

HERTS. Barnet, viii.1885, on lime bark, *EAB* (BM); and just outside the boundary at Harpenden, viii.34, on *Quercus*, *DCT* (12); (Rothamsted Expt. Station grounds), 8.viii.37, gravid ♀ egg-laying on trunk of *Aesculus*, *DCT* (12); 3.ix.54, *GGES*; and beyond at Little Gaddesden, 1934-37, in garden on apple and *Fraxinus*, ♂♂ nearly as common as ♀♀. Each ♀ copulates several times with different ♀♀, *DCT* (12); and Wymondley, *EAB* (11) and (12).

ESSEX. Epping Forest, vii.07, a single ♂ on a rotten log, *CN* (35a); (Theydon Bois), 29.vi.59, *KCS* (14).

KENT. Lee, *WW* (39); Grove Park, *WW* (39); Blackheath, *AAA* (22); Dartford, 12.vii.03, *WW* (60); Darenth, *JAP* (BM); Birch Wood, *JAP* (BM); Bromley, vi.1884, *EAB* (BM); and on the boundary at Sevenoaks, *AMM* (22); (Knole Park), 27.vii.63 and 4.vii.65, *KCS* (14) and (48).

SURREY. Chipstead, 5.viii.07 ♀♀, *ECB* (NM); Redstone near Reigate, *J&TL* (32); Reigate, *ES* (37) and (3); Mickleham, *JAP* (BM); Boxhill, 13.viii.11 ♀, *ECB* (NM); Fetcham, 20.vii.53, on elder infested with *Anobium punctatum*, *NEH* (BM); and just over the boundary at Woking, *ES* (3); Horsell, *JAP* (BM); and Chobham, vi.1876 and vii.1880, *ES* (HD) and (3); and beyond at Ewhurst, *EAB* (3).

BUCKS. On the boundary at Gerrard's Cross, 30.v.55, bred (*sic*) from the fungus *Stereum hirsutum*, *PAB* (BM); Slough (PILG), 3.vii.56, on birch log, *GEW* (40); and beyond at Longdown Hill, 21.vii.51, *WJLeQ* (21) and (SL).

Myrmedobia tenella (Zett.) Sp. 220 p. 194
S p. 211 B p. 343 (Sp. 248)

Rare. This small dark brown bug lives its larval stages amongst moss on acid or sandy soils, often beneath conifers. It reaches the final moult by June and the adults leave the moss ascending grass stems to pair. They may then be taken by sweeping; the males being macropterous and the females brachypterous or micropterous. Records required from Herts., Essex and Kent.

MIDDX. Hampstead, *JAP* (BM).

SURREY. Mickleham, *JAP* (BM); Esher, *JAP* (BM); *GCC* (BM), (37) and (3); and beyond the boundary at Woking, *ES* (3); and Gomshall, viii.1899, *EAB* (BM) and (3).

BUCKS. Beyond the boundary at Coombe Hill, 14.ix.63, *GEW* (EMM 99, 162); and Chiltern Hills, 9.viii.15, *EAB* (BM).

Myrmedobia distinguenda (Reut.) Sp. 221 p. 195
S p. 211 B p. 344 (Sp. 249)

Rare. Similar in colour to the last species, this small bug is associated with lichen-covered larch or Scots pine. The larvae live amongst fallen needles beneath the trees. When adult by mid-July they may be searched for by beating the ends of the lowest branches of the conifers.

MIDDX. Ruislip, 26.viii.24, *HStJKD* (HD).

HERTS. Barnet, viii.1885, *EAB* (BM).

ESSEX. Epping Forest (Chingford), 8.vii.11, *EAB* (BM); 15.vii.11, *EAB* (BM); and *CN* (35a); Woodford, 11.viii.25, *EAB* (BM).

KENT. Darenth Wood, 11.vi.12 ♀, *ECB* (NM) and (22); and Eynsford, 16.vii.32, brachypterous ♀, *KGB* (1/1932-33, 90).

SURREY. Mickleham, *GCC* (BM); Oxshott, vii.04, *EAB* (BM); Esher, *GCC* (BM), (37) and (3); and beyond the boundary at Woking, vii.1890, *ES* (BM) and (HD); *GCC* (BM); Chobham, 1.viii.04, on firs, *ES* (HD); and Busridge [S. of Godalming], *ES* (3).

BUCKS. Beyond the boundary at Burnham Beeches, 22.vi.12, *EAB* (BM).

Myrmedobia coleoptrata (Fall.) Sp. 223 p. 195
D&S p. 484 S p. 210 B p. 344 (Sp. 251)

Rare. Occurs beneath bark of various trees particularly *Abies* spp., and also sometimes associated with ants nests though this relationship is said to be indirect as the bug only feeds on small aphids tended by the ants. The adults have been taken in late June, in July and August.

MIDDX. Highgate Wood, vi, ♀♀, taken in some numbers under leaves on a hedgebank, *JAP* (BM), (28) and (38); later at same place, ♂♂ and ♀♀ some *in cop.* *D&S* (HD *West-Hope* coll.) (28), (38) and (10).

HERTS. Barnet, *EAB* (37) [possibly the previous species *q.v.*-EWG]; and beyond the boundary at Royston, vi.08, *EAB* (BM).

KENT. Bexley, *GCC* (4).

SURREY. Chipstead, 8.vii.16 ♀, *ECB* (NM); Claremont [Esher], *TRB* (3); Oxshott, 1900, a single ♂ in a nest of the ant, *Acanthomyops fuliginosa*, *HStJKD* (10); vii.04, *EAB* (BM); Esher, *JAP* (3); Weybridge, *JAP* (3); and beyond the boundary at Chobham, *ES* (3); Holmbury, *EAB* (3); Ewhurst, *EAB* (3); and Leith Hill, *EAB* (3).

BUCKS. Beyond the boundary at Fulmer, 26.vi.55, on grassy bank, *WJLeQ* (21); Burnham Beeches, 22.vi.12, two ♂♂ in company with the ant *Acanthomyops niger*, *EAB* (10); n.d., a single ♂ in nest of the ant *Acanthomyops alienus*, *EAB* (20) and 38).

(End of Part IV)

Notes on the Hymenoptera of the Bushy Park Area, Middlesex

By J. C. FELTON

IN 1957, P. F. Yeo published an excellent account of his captures of Aculeate Hymenoptera in and around Bushy Park, Middlesex, covering the period from August 1948 to May 1953. By a strange coincidence the writer's own collecting in the area commenced at about the time that Yeo's ceased. Between June 1952 and May 1966, the writer visited the area in most years, and took specimens on a total of 47 days distributed as follows: March—2; April—7; May—9; June—14; July—6; August—9; collecting time probably totalled something in the order of 80 hours.

Initially the writer's interests were much as those of Yeo, the ground nesting Aculeates of the grassy areas of the Park, but also extended to include the Sawflies. Latterly an attempt has been made to fill in some of the gaps in the earlier work, mainly pointed out by Yeo himself. Some attention has been paid to the social species, both ants and bumble bees, but the writer has not succeeded in studying the Hymenoptera of the enclosed woodland areas in the Park. They do not present the obvious interest of the grassland areas, but should support a number of presently unrecorded species particularly among the Sawflies.

The purpose of the present paper is to give the additions that the writer's collecting has added to Yeo's list, and to summarise our current knowledge of the fauna of the area. There are still gaps in our knowledge, and it is to be hoped that others will be stimulated to fill them.

There is little to add as regards the general description of the area. However, two features of the grassland of the Park relevant to the Sawfly fauna deserve mention. Several areas are dominated by a luxurious growth of bracken (*Pteridium aquilinum* (L.) Kuhn) and certain of the damper areas support clumps of rushes (*Juncus* spp.).

The writer's collecting has largely been in the Hampton Hill end of the Park. 29 Bushy Park Gardens (abbreviated to G in the lists below) is within 100 yards of the Park wall and some quarter of a mile from 43 Park Road, Yeo's house. Apart from the usual attractions of a suburban garden for Aculeates, a fine old brick wall facing south proved an important feature. In the lists below all records are from the Park unless otherwise stated.

LIST OF SAWFLIES

ARGIDAE

1. *Arge ochropus* (Gmelin). G, 1 ♀ 22.vii.56, 1 ♀ 15.vi.57, both on rose.

TENTHREDINIDAE

2. *Aneugmenus coronatus* (Klug). G, 1 ♀ on orange lily 26.vii.64. Ferns are present in the garden.
3. *A. padi* (L.) 7 ♀♀ on bracken 12.vi.57; G, 1 ♀ on apple foliage 16.vi.57.
4. *Selandria serva* (Fab.). 1 ♂ 30.v.55, 1 ♂ within an enclosure 22.v.66.
5. *Dolerus triplicatus* (Klug). 1 ♂ 23.v.54.
6. *D. liogaster* (Thomson). 1 ♂ 19.iv.54.

7. *D. possilensis* (Cameron). 1 ♂ 19.iv.54.
8. *D. sanguinicollis* (Klug). 1 ♂ among grass 8.iv.64.
9. *D. picipes* (Klug). 3 ♂♂ 1 ♀ 23.v.54, 1 ♀ 30.v.55, 2 ♂♂ 7 ♀♀ 12.vi.57, 1 ♀ 5.vi.65, 2 ♂♂ 22.v.66. The dominant Sawfly of the grassy areas of the Park.
10. *D. nigratus* (Müller). G, 1 ♀ in kitchen 27.iv.65.
11. *Ametastegia pallipes* (Spinola). G, 1 ♀ 26.vii.59.
12. *Caliroa cerasi* (L.). G, 1 ♀ 26.vii.59. That year a pear tree in the garden was defoliated. Some attack on pear is noticed in most years.
13. *Monophadnoides waldheimii* (Gimmerthal). G, 1 ♀ on *Geum* 14.v.61. Larvae with branched hairs were noted on this same plant on 3.v.61. This species has been reported as a pest of garden *Geum* from Middlesex by Andrewes (1952).
14. *Cladius difformis* (Panz.). 1 ♀ 30.v.55, 2 ♀♀ 13-16.vi.57, 1 ♂ 6.vi.65; G, 1 ♀ 5.vi.54.
15. *Pristiphora pallipes* (Lep.). G, 1 ♀ on leaves of *Crocus* 23.iii.57. There are gooseberries in the garden.
16. *Pachynematus* sp. 1 ♀ 12.vii.57, 1 ♀ among grass 8.iv.66. Unfortunately the writer has taken only females, and so the species is uncertain.

This short list of 16 species must represent but a small fraction of those to be found if the moister areas are carefully worked, and also the wooded enclosures. However, a clear pattern is established. Eight species, half of those listed, are associated with grasses, sedges and rushes. Two species are associated with ferns. Of the remaining six species, five can be termed "pest species" and were only found in the garden.

ADDITIONS TO THE AREA LIST OF ACULEATES

TIPHIIDAE

1. *Tiphia minuta* (V.d.L.). 1 ♂ 5.vi.53. A most interesting capture as this species is one noted by Guichard and Yarrow (1948) as having disappeared from Hampstead Heath.

POMPILIDAE

2. *Priocnemis perturbator* (Harris). 1 ♀ 17.v.53. This adds another Pompilid species to the already long Bushy Park list. It also increases the similarity with Hampstead Heath, as a specimen probably of this species is reported as just escaping capture by Guichard and Yarrow (1948).

FORMICIDAE

3. *Myrmica scabrinodis* (Nyl.). 1 ♀ 5.viii.63, 1 ♀ 7.viii.63, 1 ♀ 5.vi.65. *Myrmica* spp. are not common in Bushy Park, but as might be expected this is the most frequent species to occur.
4. *M. sabuleti* (Nyl.). 1 ♀ 5.viii.63.
5. *Lasius flavus* (Fab.). ♀♀ 7.v.53, ♀♀ 14.v.61, several nests 24.iv.65, nests 5.vi.65; G, 2 nests with alates 25.vii.64. There is no doubt that over large areas of the Park this species is the dominant Hymenopteran, indeed the dominant insect. Mounds are numerous and often large, affecting the flora and also the fauna. For instance the surface of mounds have been seen pockmarked by the emergence holes of Acridid grasshopper nymphs.

6. *Lasius niger* (L.). ♀ 14.v.61, ♀♀ 26.vii.64, ♀♀ 24.iv.65, nests 5.vi.65; G, nests with alates 25.vii.64.

VESPIDAE

7. *Vespula germanica* (Fab.). 1 ♀ at *Carduus* 11.vii.63; G, 1 ♀ 14.vi.52.

APIDAE

8. *Andrena barbilabris* (Kirby). G, 1 ♀ 6.vi.53.
 9. *A. wilkella* (Kirby). G, 1 ♀ taken out of three at Lupin 7.vi.65.
 10. *Anthophora furcata* (Panz.). G, 1 ♀ 14.vi.57.
 11. *Megachile centuncularis* (L.). G, 1 ♀ 22.vii.56, 1 ♀ 15.vi.57.
 12. *Anthidium manicatum* (L.). G, 1 ♂ 12.viii.61, ♂♂ ♀♀ 2.viii.63.
 13. *Bombus terrestris* (L.). 2 ♀♀ at clover 5.viii.63, 2 ♂ 1 ♀ 2 ♀♀ at *Carduus* and clover 7.viii.63; G, 1 ♀ 4.vi.53.
 14. *B. lucorum* (L.). 1 ♂ at *Carduus* 11.viii.63; G, 1 ♂ at *Doronicum* 2.viii.63, 1 ♀ 5.vi.65.
 15. *B. lapidarius* (L.). 1 ♀ 26.viii.59, 1 ♂ at *Carduus* ♀♀ on clover 5.viii.53, 1 ♀ on yellow composite, 2 ♂♂ at *Carduus* 7.viii.63.
 16. *B. pratorum* (L.). G, 1 ♀ 18.iv.54, 1 ♂ 5.vi.65.

NOTES ON OTHER SPECIES OF ACULEATES

CHRYSIDIDAE

Hedychridium coriaceum Dahlb. 1 about a *Lindenius albilabris* (Fab.) colony 9.viii.63.

Chrysis ignita (L.). G, 1 ♂ 1 ♀ 14.vi.57. These two specimens have been examined by Dr. I. H. H. Yarrow who has been engaged on a revision of the group and determined by him as *C. ignita* (L.) s. str.

SPHECIDAE

Cerceris arenaria (L.). The species is numerous in several parts of the Park. A colony was observed on 11.viii.63 nesting at a density up to 30 burrows to the square yard, with say 100 burrows along a 30–40 yard stretch of path. Five weevils were taken from returning females and all proved to be *Strophosomus faber* Hbn.

APIDAE

Andrena haemorrhoa (Fab.). 6 ♂♂ 19.iv.54. An addition to the Park list.

A. jacobae Perkins. 1 ♀ 17.v.53. An addition to the Park list.

A. armata (Gmelin). Many ♀♀ 24.iv.65. An addition to the Park list. This species is abundant and widespread. It nests in the ground both along the hard worn paths and in the general grassland, where the females climb down the grass to reach their burrows.

Megachile ligniseca (Kirby). G, 1 ♀ 12.viii.61. This species had been recorded in the district only by Saunders (1896).

SUMMARY OF BUSHY PARK ACULEATES

Yeo recorded a total of 102 species. This can be increased to 105 if the two species *Vespula vulgaris* (L.) and *Andrena denticulata* (Kirby) given in his Summary List only and Saunder's record of *Megachile ligniseca* (Kirby) from Hampton Court are included. To this 16 species have been added.

(The following details have since been supplied by Yeo: *Vespula vulgaris* (L.), ♀, 26.viii.51; *Andrena denticulata* (Kirby), E, at *Solidago*, 16.ix.51; both in the garden of 43 Park Road, Hampton Hill).

In the comparison between this area and Hampstead Heath, these species add to the similarity. Of the 16, 14 are on the Hampstead Heath list. One, *Priocnemis perturbator* Harris, may have occurred at Hampstead, but the specimen escaped. The ant *Myrmica sabuleti* Nyl. is an addition to the list of species from Bushy Park not recorded from the Heath.

The comparison between the two areas, now including the ants, is:—

	<i>Bushy Park and District</i>	<i>Hampstead Heath and District Total</i>	<i>Present Century only</i>
Wasps	63	83	65
Ants	4	16	7
Bees	54	122	101
TOTAL	121	217	173

Thus the known fauna of Bushy Park remains poorer than that of Hampstead Heath, particularly as regards bees.

A NOTE ON GASTERUPTION MINUTUM

Although no study of the parasitica has been attempted, one record of a parasite of Aculeates is felt worthy of mention.

Gasteruption minutum (Tournier). G, 1 ♂ 2 ♀♀ 13-16.vi.1957, at least an additional 1 ♂ 3 ♀♀ present. This small colony was under observation for a number of hours, flying up and down an old brick wall some 6 feet high and aligned approximately E.-W. The sunlight first reached the south side of the wall at about 10 a.m. (B.S.T.) and the wall became shaded at about 5.30 p.m. The *Gasteruption* was found to be active virtually constantly between 10.15 a.m. and 5 p.m., with the maximum activity between 2 and 3 p.m. It was possible to approach within 1 foot or less of individuals while they were settled on the wall, and there was never any indication that any other species was represented.

The ♀ *Gasteruption* were extremely interested by the brick wall. They flew along its face keeping within an inch or two of the brickwork, quartering its surface, and alighting at any irregularity or hole. On alighting the wings were immediately folded, and while walking about the hole or crack, the abdomen was moved up and down 2-3 times/second, a movement somewhat reminiscent of *Eristalis tenax* L. In general only the top half of the wall was inspected, though during the period of maximum activity, some attention was paid to lower levels, even down to ground level.

The ♂ *Gasteruption* were more difficult to observe as they very seldom alighted. They flew rather faster than the ♀, and never descended very much below the top of the wall. If a ♀ was encountered, the ♂ became very agitated, and flew around the point of encounter, alighting frequently. On alighting, the wings continued to vibrate, and, with abdomen held still and with the tip slightly raised, a few slightly wavering steps were taken towards the female. In all encounters seen the ♀ responded by flying away, but the ♂ continued to be active around the site for a minute or two.

While the above observations were being made the following Aculeates were taken on or about the wall:—

Omalus auratus (L.). 1, on apple.

Chrysis ignita (L.). 2, on wall.

Trypoxylon clavicerum Lep. 1 ♂, 1 ♀, about old post.

Cemonus lethifer Shuckard. 4 ♀♀, on apple.

Psenulus atratus (Fab.). 1 ♀, on apple.

Crossocerus elongatulus (V.d.L.). 13 ♂♂, 6 ♀♀, on wall, at least 1 ♀ nesting.

Prosopis hyalinata (Smith). 4 ♂♂, 2 ♀♀, on wall, 1 ♂ in a hole.

Halictus smeathmanellus (Kirby). 1 ♀, about *Antirrhinum*.

Halictus morio (Fab.). 2 ♀♀, about *Antirrhinum*.

Anthophora furcata Panz. 1 ♀, about old post.

Megachile willughbiella (Kirby). 1 ♂, on yellow legume. 2 ♀♀, about wall.

Megachile centuncularis (L.). 1 ♀, about wall.

Osmia coerulescens (L.). 1 ♀, on yellow legume.

The majority of these can be dismissed as possible hosts for the *Gasteruption*, as any host must have been nesting in the wall. The *Cemonus* and *Psenulus* were attracted by aphids present on the suckers of an old apple stump, with the *Omalus* presumably after the former. The *Trypoxylon* and *Anthophora* were attracted by an old post, and the 2 spp. of *Halictus* by *Antirrhinum* flowers. The *Crossocerus* and *Prosopis* were directly interested in the wall, as were the 2 *Megachile* spp., and potentially the *Osmia*. The most likely host is the *Prosopis*. *Prosopis* spp. are known as hosts of other *Gasteruption* spp. Also the *Prosopis* were most active about the upper half of the wall. However, the hole from which the ♂ *Prosopis* emerged was a smaller hole than the ones that attracted the attention of the *Gasteruption*, and certainly the association is not proven.

G. minutum is not a common species of *Gasteruption*, but is recorded from Mill Hill by Crosskey (1951).

REFERENCES

- ANDREWES, C. H., 1952, *Monophadniodes waldheimii* Gimm. (Hym., Tenthredinidae) a pest of garden *Geums*. *Ent. mon. Mag.*, 88, 47.
- CROSSKEY, R. W., 1951, The morphology, taxonomy, and biology of the British Evanioidea (Hymenoptera). *Trans. R. ent. Soc. Lond.*, 102, 247-301.
- GUICHARD, K. M. and YARROW, I. H. H., 1948, The Hymenoptera Aculeata of Hampstead Heath and the surrounding district, 1832-1947. *Lond. Nat.*, 27, 81-111.
- YARROW, I. H. H., 1954, Records of Aculeate Hymenoptera at Hampstead. *Entomologist*, 87, 168-169.
- YEO, P. F., 1957, Bees and wasps in Bushy Park and at Hampton Hill, Middlesex. *Lond. Nat.*, 36, 16-24.
- , 1963., Some records of *Pompilus trivialis* Dahlb., *P. unguicularis* Thoms. and *P. wesmaeli* Thoms. (Hym., Pompilidae). *Ent. mon. Mag.*, 98, 124.

Survey of Bookham Common

TWENTY-FIFTH YEAR

Progress Report for 1966

GENERAL (C. P. Castell)

An event, which involved the small survey team in a great deal of work, was the "open week-end", July 16-17, when an exhibition was staged in the Research Centre. The topography, geology and natural history of the Common were demonstrated by maps, photographs, drawings, diagrams and specimens. Mr. L. Manns, who had intended organising the week-end and a nature trail, had to leave London early in the year and was unable to help. The nature trail had to be abandoned, but small parties of visitors were shown over the common informally.

The amenities of the Research Centre were further improved by the addition of a steel storage cupboard, a set of small-mammal live traps and about a dozen standard works on ecology and field natural history which, it is hoped, will be the nucleus of a working field library. Good use was made of the mammal traps by a party of senior school boys, under the supervision of Mr. P. Moxey. The party camped for a week in a field on the edge of the Common and made a study of the distribution of the smaller mammals; a report on this may be found on page 126.

Mr. L. Manns continued his study of leaf-litter fauna in the early part of the year before he left London and the results of his work appear on page 116.

Although Mr. Castell had to resign from the National Trust's Bookham Commons Management Committee through inability to attend the meetings, close co-operation between the Committee and the Society continues.

Mr. F. L. Reynolds, the Surrey Naturalists' Trust's Conservation Officer, visited the Common in August and discussed conservation problems with members of the survey team.

VEGETATION (C. P. Castell)

The re-survey of the 60 ft. square "Short Grass Quadrat" in Central Plain, started in 1965, was completed. A start has been made on a re-survey of the Long Grass Area.

INSECTA—LEPIDOPTERA (C. B. Ashby)

Limited sampling of the moths of the common (cf. *Lond. Nat.*, 45, 51, 1966) was continued in 1966, using a mercury vapour lamp from the survey hut. Experiments were also started with an actinic blue 6-watt fluorescent tube in a transistorised portable apparatus.

The following additions to the list by Mr. A. S. Wheeler in *Lond. Nat.*, 34, 28, 1954, were recorded:—

- 118 – *Odontosia carmelita* Esp.—Scarce Prominent
- 323 – *Cerastis rubricosa* Schiff.—Red Chestnut Rustic
- 575 – *Agrochola lota* Clerck.—Red-line Quaker
- 800 – *Chesias legatella* Schiff.—Streaked Carpet

The numbers and the scientific names are those used in Heslop's Revised Indexed Check Lists, *Ent. Gaz.*: 1959-1963.

INSECTA—NEUROPTERA (C. P. Castell)

Mr. A. E. Le Gros has been unable to visit the Common for some years, but he has recently sent me the following preliminary list of Lacewings noted in 1952-53. C.P.C.

NEUROPTERA (LACEWINGS)

(nomenclature in accordance with F. C. Fraser (1959))

1. *Contwentzia psociformis* (Curtis). On oak, June.
2. *Coniopteryx tineiformis* Curtis. On Hawthorn, June; on willow by I.o.W. Pond, July.
3. *Hemerobius lutescens* Fabr. Frequent June, August on oak.
4. *H. humulinus* L. A female, July 13. Whilst in tube was seen to eat her eggs as soon as laid.
5. *H. micans* Olivier. August.
6. *Symphorobius pygmaeus* (Rambur). On oak, August.
7. *Kimminsia subnebulosa* (Stephens). October.
8. *Chrysopa perla* (L.). Frequent, widespread June, July and in May 1953.
9. *C. flava* (Scop.). Oak, August.
10. *C. carnea* Stephens. Frequent in rides and edges of woodland.
11. *C. ventralis* Curtis. Frequent about ponds, July.
12. *C. septempunctata* Wesmael. Central Plain, August.
13. *C. albolineata* Killington. Abundant in September, Central Wood—the dark spotted form.

ARACHNIDA (C. P. Castell)

Mr. A. E. Le Gros has also sent the following preliminary lists of False Scorpions and Harvestmen noted in 1952-53. C.P.C.

PSEUDOSCORPIONES (FALSE SCORPIONS)

(nomenclature in accordance with Owen-Evans and Browning (1954))

1. *Chthonius tetrachelatus* (Preyssler). S.E. Wood under bark, July.
2. *Roncus lubricus* L. Koch. In detritus at foot of tree by meeting spot, I.o.W. Pond, July.
3. *Neobisium muscorum* (Leach). Under moss, foot of oak, Central Wood.
4. *Cheiridium museorum* (Leach). Under bark, Central Wood, August.

HARVESTMEN (OPILIONES)

(nomenclature in accordance with Savory (1948))

1. *Nemastoma lugubre* (Müller). Common. Under stones, logs, Central and Eastern Plain, in grasstuft, Bayfield Plain (8.iii.53), under leaves base of tree, S.E. Wood.
2. *N. chrysomelas* (Hermann). Common in woodland throughout year.
3. *Leiobunum rotundum* (Latr.). Common fringes and rides in woods, June-August. Often seen in numbers on tree trunks.

4. *L. blackwalli* Meade. Seen on tree trunks, August with *rotundum*. (Recorded by W. S. Bristowe from Bookham.)
5. *Mitopus morio* Fabr. (Recorded by Bristowe.) Seen once, July, Central Wood.
6. *Oligolophus agrestis* (Meade). Eastern and Central Woods, frequent, July, August.
7. *O. hanseni* (Kraepelin). (Recorded by Bristowe). Not seen.
8. *Odiellus palpinalis* (Herbst). Eastern Plain, July.
9. *Lacinius ephippiatus* (C. L. Koch). Central Plain, June.
10. *Phalanguim opilio* Linn. Frequent on plains and in rides, July.
11. *Opilio parietinus* (De Geer). Occasional in woodland, August.
12. *Megabunus diadema* (Fabr.). In woodland especially on oak, amongst lichen and moss. Common throughout year.

In 1947 Mr. A. E. Ellis sent to the Ecology Section the following records made "recently" while investigating the mollusca. Although regarded by Mr. Ellis as "very incomplete", it is thought they might now be added to Mr. Le Gros' records.

PSEUDOSCORPIONS

- Chthonius ischnochelus* (Herm.). Hill House Wood.
C. orthodactylus (Leach). Central and Mark Oak Woods.
C. tenuis L. Koch. Mark Oak Wood.

HARVESTMEN

- Leiobunum blackwalli* Meade. Mark Oak, Hill House and Hollowwoods; marsh near Manor Pond, Central Plain.
L. rotundum (Lat.). Mark Oak, Hill House and South East Woods; Central Plain.
Megabunus diadema (Fabr.). Stents Wood, Mark Oak Wood.
Mitopus morio (Fabr.). Hill House Wood.
Nemastoma lugubre (Müll.). Hill House Wood; margin of U.E. Pond.
Odiellus palpinalis (Herbst.). Hill House Wood; Mark Oak Wood.
Oligolophus agrestis (Meade). Central, Hill House, Mark Oak and Hollow Woods; Marsh near Manor Pond, Central Plain.
Platybunus triangularis (Herbst.). Frequent in Stents and Mark Oak Woods, Hill House, Hollow and South East Woods; marsh near Manor Pond, Central Plain.

Mr. J. Cooper contributes the following record of a Pseudoscorpion:—
Chthonius ischnochelus (Hermann).

Five specimens from rubble dump a few yards from Research Hut (Ref. 5713) and one under fragment of oak bark in leaf litter in S.E. Wood (Ref. 8614). Both collected on 17.vii.66.

BIRDS (G. Beven)

Oakwood (Eastern Wood)

The breeding season census was repeated in this 40 acre sample of dense interior oakwood. The numbers of territories of singing males in the years 1963, 1964, 1965 and 1966 respectively were as follows: Chaffinch 5½, 7, 8, 7, Nuthatch 2, 5, 5, 5, Great Tit 12, 17, 17, 12, Blue Tit 19, 19, 22, 17, Coal Tit 2, 5, 4, 3, Marsh Tit, 3, 1, 1, 3, Longtailed Tit 0, 0, 1, 2, Chiffchaff 2, 5, 7, 6, Willow Warbler 2½, 1½, 4, 4, Garden Warbler 2, 2, 4, 1,

Blackcap 5, 3, 4, 7, Mistle Thrush 1½, 2, 3, 2, Song Thrush 4, 7, 7, 8, Blackbird 8, 10, 12, 11, Robin 21½, 32, 37, 37, Dunnock 4, 5, 5, 4 and Wren 1, 5½, 11 and 17.

The first definite record of the breeding of the Starling in Eastern Wood was in 1962 (see G. Beven, 1963, *Lond. Nat.*, 42, 98-100). Territorial male Starlings were not recorded in this wood in the spring over the period 1949 to 1958, but in 1959 one bird took up a territory there and in 1960 two did so. There were 3 in 1961, 2 in 1962, 5 in 1963, 5-6 in 1964, 10 in 1965 and 6 in 1966. There has thus been a marked increase in numbers since 1959, but in 1966 there seems to have been a drop back to the 1964 level. The Great Tits have considerably decreased after large populations in 1964 and 1965; Blue Tit numbers have also declined slightly. The Robin population remains high and the Wrens have staged a complete recovery from the disaster in 1963 when they were nearly exterminated in the wood. The Sparrowhawk has been recorded in this wood almost every spring until 1959. Since then it has only been seen occasionally and usually at other seasons. On the other hand there has probably been one pair of Tawny Owls present in this wood throughout the period 1950 to 1966.

Scrub and Grassland

The spring census of the number of territories of singing males was again made on 96 acres of scrub and grassland in 1966. Mr. W. D. Melliush reports the following numbers of territories on 61 acres (Western, Isle of Wight and Bayfield Plains) during 1963, 1964, 1965 and 1966 respectively: Chaffinch 9, 10, 9, 9, Reed Bunting 2, 3, 1, 2, Yellow Hammer 5, 7, 5, 5, Willow Warbler 8, 7, 8, 10, Whitethroat 8, 6, 9, 8, Blackbird 5, 8, 5, 8, Robin 4, 6, 8, 5 and Wren 1, 1, 2, 5.

A similar census was made again on Central plain, a further 35 acres of scrub and grassland. The numbers of territories of singing males in 1964, 1965 and 1966 were as follows: Chaffinch 8, 4, 4, Reed Bunting 0, 1, 3, Yellow Hammer 2, 2, 4, Willow Warbler 13, 6, 9, Whitethroat 6, 8, 9, Song Thrush 5, 4, 4, Blackbird 7, 3, 5, Robin 17, 15, 10, Dunnock 6, 7½, 7 and Wren 1, 1, 4. It is interesting to note the extent of the recovery of the birds which had decreased after the fire which blackened 20 acres on March 31, 1965. There have been no significant fires in this scrub area since then. The Willow Warblers have only made a partial recovery and this may perhaps be due to the fact that the shrubs in which they mainly feed had also not fully grown up again. Blackbirds similarly showed only partial recovery in numbers. The Whitethroats which actually increased after the fire, have maintained their numbers. Wrens have made a good recovery this year in both census areas in open scrubland, whereas the Robins seem to have decreased. During November and December, 1966 a further 2 acres or so of Central Plain have been cleared of scrub leaving only a few scattered tree saplings. This means that about 10 of the 35 acres of Central Plain have been thus cleared of scrub since the winter of 1963-4. It will be interesting to observe the effect of this scrub clearance on the numbers of birds nesting there next spring.

Other notes on the birds

Two pairs of Little Grebe nested on the Isle of Wight pond; young from both broods were seen being fed. A Sparrowhawk was seen in

July and August, and at least one pair of Kestrels was resident. One Woodcock was roding on April 24 when a form of display was seen in which two birds flew very close together, sometimes as near as 4 feet, twisting and turning violently, both calling "tsiwick", about 15 feet above the ground.

One Barn Owl was heard on April 24 and at least 2 were recorded in August. A census of Tawny Owls heard hooting was made on October 29 and there appeared to be at least 6 birds on or very near the Common. Four of these Tawny Owls were heard hooting from different parts of the 250 acres of oakwood, the same numbers recorded in 1965. This would indicate a mean territory size of about 60 acres, but it is quite likely that the actual number of Tawny Owls present is greater than four, this figure being obtained from only one count. Mr. H. N. Southern has shown that 30 pairs of Tawny Owls could maintain themselves on 1,000 acres of woodland at Wytham, giving a mean territory size of about 33 acres (1959, *Ibis*, 101, p. 431). Perhaps more counts are needed on the owls at Bookham.

Kingfishers were rather more in evidence this year, one or two birds being seen in January, February, March, October and December. There were again two pairs of Great Spotted Woodpeckers in Eastern Wood during the spring, as there have been annually, at least since 1961. One or two Blue Tits regularly roosted in the research hut during the winter months. The number of pairs of Longtailed Tits in the breeding season in an area of about 120 acres of grassland with thick scrub and outskirts of woodland during 1961 was 6, in 1962, 6, in 1963 nil, 1964 3, 1965 4 and 1966 4. There were two pairs in Eastern Wood in 1966 (1962 2, 1963 nil, 1964 nil, 1965 1). Six singing male Grasshopper Warblers were present in the spring; this seems to be the highest figure recorded since 1942.

There were 3 or possibly 4 territories of displaying male Redpolls on Western, Isle of Wight, Bayfield and Central Plains in 1966 (up to 1962 there were none, 1963 1, 1964 2, 1965 2). Three Siskins *Carduelis spinus* were noted by Isle of Wight pond on March 13 by Mr. Malcolm Green. Four Crossbills *Loxia curvirostra* were seen flying over the Common on July 10 and several flew over on October 9 (several observers). The last two species are not included in the check list of birds of the Common (L. I. Carrington, C. P. Castell and A. R. Wilton, 1944, *Lond. Nat.*, 23, 23-29 and G. Beven, 1963, *Lond. Nat.*, 42, 98-100).

Birds feeding on plant galls

More information is required on the feeding of birds on plant galls. It is well known that titmice feed extensively on certain plant galls. Miss Monica Betts found that in oakwood tits took considerable numbers of Cynipid larvae from August to January, especially Great and Blue Tits, but to a lesser extent also Coal and Marsh Tits (1955, *Jour. Anim. Ecol.*, 24, 282-323). The larvae of *Andricus collaris* (Hart) from Marble galls and *Andricus ostreus* from oyster galls were specifically identified, whereas various other species were eaten as adults. In addition a considerable amount of vegetable oak gall tissue was found in the stomachs of Blue, Great, Coal and Marsh Tits during the autumn and winter. On Bookham Common many of the Marble galls are opened by birds. We have observed Blue Tits opening them in December and January; these birds peck vigorously at the gall perhaps for 10 minutes and then

extract the larvae from the central chambers. The galls seem very hard objects for the little bird to open and it has to peck with considerable force. In this connection it is interesting to quote from Rosalie Lulham (1923, *Introduction to Zoology*, London. p. 476): "Comparatively few galls are without the hard inner shell, which doubtless serves to protect the larvae within from the attacks of parasites, and from small birds which might try to peck open the gall to get at the grub. The tannin in some such as the Marble gall, renders them still more distasteful to birds" Evidently these defences are not sufficient to prevent a high degree of predation on Bookham Common. Sample counts were made on 8.i.67 and 19.ii.67, chiefly on sapling oaks up to about 7 feet above the ground in scrubland areas. Of 359 Marble galls examined, 104 (29%) were considered to have been opened by birds down to the central chambers. A similar search was made inside Eastern and Central Wood on 12.ii.67. Of 48 marble galls counted, 32 (67%) had been opened in the same way. Galls well under average size have not been included in the samples; few of the very small galls had been opened. Lulham states that the wasps usually emerge from these galls in September and October, but occasionally remain within the gall until May.

Birds other than tits will feed on marble galls, notably the Great Spotted Woodpecker, which even as late as April, was observed to pull a gall off the twig, carry it to the trunk, hold it down and peck at it until opened. There is a photograph of one of these woodpeckers which had been found starved to death after an oak gall (probably a marble gall) had become impaled on its bill so firmly that it was unable to pull it off or break the gall (E. J. Hosking and C. W. Newberry (1946) *More Birds of the Day*, London, pp. 16, 18). In March we have seen a Nuthatch pecking at marble galls without removing them from the twigs. Information concerning bird predation on other galls on Bookham Common is scanty. On 9.i.55 a Blue Tit was seen by Miss D. A. Rook, pecking at a gall of *Diastropus rubi* Bouché on bramble in oakwood (gall determined by Mr. M. Niblett who considered that it would have probably contained larvae). On 14.viii.66 a Marsh Tit was watched picking small "galls" off the underside of oak leaves in the canopy. It held the "gall" on to a twig with its foot and pecked at it, appearing to eat the contents and this performance was repeated again and again. The galls could not be identified. Cherry galls *Diplolepis quercus-foli* have also been found opened (probably by tits) in October.

MAMMALS (G. Beven)

Rabbits were numerous in the first half of 1966 and two burrows were found newly excavated under the Survey's research hut in early July when young rabbits were noted using one of the burrows. At the beginning of August, 1966 there was an outbreak of Myxomatosis on the Common. Dead or dying rabbits with signs of this disease were found on Western Plain (ref. 42), Banks Plain, Mark Oak Wood (ref. 38) and Banks Path (ref. 4676) and the Isle of Wight (ref. 571). The two burrows under the research hut suddenly became deserted and overgrown with grass. However, a number of healthy rabbits remained and were noted on the Isle of Wight (ref. 571) and Central Plain during the autumn.

A nest of a Harvest Mouse *Micromys minutus* (Pallas) was found on Central Plain (ref. 8537) on 12.ii.67. This was a breeding nest, having

been constructed in 1966 and fixed to the stems of the Common Rush *Juncus conglomeratus* and Fleabane *Pulicaria dysenterica*. It was a neat ball woven of grasses with some leaves incorporated and was 9 inches above the ground. It measured 4 inches in height and 3 inches across and 3 inches from front to back.

REFERENCES

REFERENCES NOT INCORPORATED IN THE TEXT

- FRASER, F. C., 1959, *Mecoptera, Megaloptera and Neuroptera*. Handbooks for the Identification of British Insects, Vol. 1, pts. 12 and 13. Royal Ent. Soc., London.
- EVANS, G. O. and BROWNING, E., 1954, *Pseudoscorpiones, with a key to the species*. Synopses of the British Fauna, 10. Linn. Soc., London.
- SAVORY, T. H., 1948, *Opiliones (Arachnida) and Harvestmen*. Synopses of the British Fauna, 1. Linn. Soc., London.

Leaf Litter Fauna in the Ecology of Ground-Feeding Birds

By L. MANNS

INTRODUCTION

CENSUS work in Eastern Wood, Bookham Common, has revealed marked seasonal fluctuations in the numbers of birds present, in a pattern which is largely determined by a variety of external factors. Of these, the most influential is undoubtedly the food supply available to the birds throughout the year.

It was therefore decided that an aspect of the feeding ecology should be investigated, and in order to keep the work within the limits of the time and equipment available, the study concentrated on two species, (the Black-bird *Turdus merula* and the Robin *Erithacus rubecula* and the habitat from which the greater part of their winter food is obtained—the leaf litter.)

STUDY AREA

A site for the study was selected in Eastern Wood (survey map reference 566) within the area used for the bird census.

This woodland, which has been described by Steele (1947) and Beven (1951, 1953), is a Pedunculate oakwood of mixed age, with the mature trees forming a closed canopy, and a shrub layer of Hawthorn *Crataegus* sp. and Hazel *Corylus avellana* the density of which varies from place to place. In those parts of the wood with a more open growth of scrub, the ground is covered by dense mats of Bramble *Rubus fruticosus* agg. and honeysuckle *Lonicera periclymenum* or by considerable areas of

Bracken *Pteridium aquilinum*. Where, however, the shrub layer is close-growing and casts a heavy shade, the typical ground cover is reduced to a little thin Bramble or is entirely absent, e.g., the "dense Hawthorn" type of vegetation illustrated in Beven (1953), and one of these Hawthorn-shaded areas was chosen for the study site, mainly because it made sampling easier.

The layer of litter below the Hawthorns consists mostly of the leaves of Oak *Quercus robur* (about 80%) and Hawthorn (about 20%), with a very small admixture of other species such as Hazel, Birch *Betula* sp. and Holly *Ilex aquifolium*.

The surface of the litter is fairly level and, following the variations in the soil level, has in general a depth of between 1 and 3 inches, although there are deeper drifts in the dry ditches and other hollows.

The Common as a whole is on London Clay and while this has in the main given rise to a clay soil, there are areas where the London Clay is covered by Plateau Gravel and Alluvium, resulting in different soil types in these areas and also where there has been a down-wash of sand and pebbles from the slopes of the Plateau Gravel into the surrounding clay soils (Castell, 1965). In the study area, there is a layer of decomposing leaf humus at the surface, to a depth of about 2 inches, and below this a heavy clay loam containing a considerable proportion of sand and pebbles. Analyses carried out in 1950 (Castell, 1965) showed clay loam at a site in Central Wood (map reference 555) about 300 yards west of the study area, and sandy loam at a site on the Plateau Gravel (map reference 622) about 450 yards north-east of the study area. As with most clay soils, that in Eastern Wood retains a high level of moisture in the winter, but tends to dry to a hard, compact mass in summer.

METHOD

The samples were collected at 18 of the Ecological Section's monthly meetings between March 1964 and January 1966, at about 11.30 a.m. (G.M.T.) in winter, and 10.30 a.m. (G.M.T.) in summer.

For each sample, as level a site as possible was selected, a square of 1/4 sq. metre was marked off on the ground, and the leaves and twigs within the square, together with a scraping of about 1/2 cm. of the soil surface, were collected into a polythene bag by hand and trowel.

From December 1964 onwards, temperatures were taken at the same time as follows:—

1. Air (about 3 inches above the litter surface).
2. Surface of litter.
3. Surface of soil (below the litter).
4. Soil (at a depth of about 2 inches).

A relative estimate of the amount of moisture in the sample was made ("wet", "damp" or "dry") and, when the study of the sample had been completed, its volume was measured in a suitably-sized tin.

Each litter sample was sorted by hand, and the invertebrates found were collected by forceps and pooter (aspirator) and transferred to a 3% formalin solution for later sorting.

Extraction of soil fauna is usually carried out mechanically, using methods which take advantage of the fact that the invertebrates have a tendency to move away from light and heat. Although these methods are more efficient than hand-sorting, they are both space and time-consuming,

and it was found from an analysis of two samples, one sorted by hand and a control sample "sorted" by means of a Tullgren funnel (using a low-powered electric-light bulb as a light source and slow-drying agent), that for the larger invertebrates the results were fairly comparable, the Tullgren funnel giving a more complete extraction of the smaller organisms only. In practice it was found that the faster-moving animals, such as the larger spiders, beetles and harvestmen, tended to escape before the sample could be collected, but the numbers were probably not large enough to affect the final results.

For the purposes of the present study, which was concerned with the litter fauna as a potential food supply for the ground-feeding birds, it was considered sufficient to collect the larger organisms by systematic hand-sorting, as it appears unlikely that Robins take invertebrates smaller than about 2 mm. in body-length and, from their larger size, it may be expected that Blackbirds take correspondingly larger organisms. Lack (1943) found from analysis of pellets and gizzard contents that the winter food of the Robin consisted chiefly of small insects, the majority of which were small beetles, although he did not quote any sizes.

When the examination of the litter sample had been completed, the organisms collected were sorted, identification being carried out to class, order or family level, this being considered sufficient for the present study. Table I (a) gives details of the animals collected from the samples.

BIRD POPULATION AND FEEDING SITES

Results from the still-continuing survey of the birds of the 40-acre Eastern Wood, which commenced in 1946 (Beven, 1951, 1953, 1956, 1963), have revealed a pattern of seasonal fluctuations in the population structure, both as to species and numbers. Although due allowance must be made for the spring influx of the warblers and the greater conspicuousness of the singing males among the resident birds, and also the difficulty of counting the silent birds in the thick vegetation of late summer, the seasonal pattern still remains.

From the data obtained, Beven (pers. comm.) has concluded that Blackbird numbers, as shown in Fig. 1 (a), increase in May and June when birds from outside come into Eastern Wood to take the small caterpillars which have then dropped to the ground, after which many leave, some to feed on the berry crop in the adjacent grassland scrub during September, October and November, but that the decrease is to some extent only an apparent one as the birds are moulting and secretive and difficult to count. A number of birds return to the wood in November and December, taking food mainly from the leaf litter, but numbers fall to an actual low level in February and March.

With regard to the Robin, Beven considers that the results, shown in Fig. 1 (b), indicate that most of the birds have left the wood by December, probably not more than 20% remaining in December, January and February, after a steady exodus throughout the autumn (the low numbers in July and August are undoubtedly a reflection of the extreme difficulty of counting Robins in dense woodland in late summer). There is a build-up of numbers in March and April with a return to the wood to take up breeding territories, the population peak being reached in April and May.

It appears that the first two months of the year are the crucial ones for the Robin, and February and March for the Blackbird, the numbers

present in any year being determined by the duration of periods of severe weather at this time. It is interesting to note that the movement of Robins out of the wood in the autumn occurs long before there can be any significant shortage of food.

The Robin and the Blackbird are both species which take a considerable part of their food from the leaf litter. In a study of the feeding sites of birds in Eastern Wood (Beven, 1959), ground-feeding records for the Robin accounted for 51% of the observations in summer and 57% in winter, and for the Blackbird, 97% in summer and 84% in winter.

The two species vary somewhat in their feeding habits, the Robin frequently searching the ground from a vantage-point in the herbs or shrubs, with the Blackbird generally finding its food by turning over the leaf litter. This, together with a possible difference in the size of prey taken, may be useful in reducing inter-specific competition in this habitat, an aspect which might well be worth some study.

THE LEAF LITTER: A HABITAT AND ITS INHABITANTS

The fauna inhabiting the leaf litter is, with a few exceptions, the same as that of the underlying soil, and indeed there is a considerable amount of movement of individuals between the two. An investigation of the soil fauna would normally need to take account of the inhabitants of both of these "layers", but for the purposes of the present study, the litter layer must be considered as a separate entity, as the organisms below ground-level are not generally available to the ground-feeding birds. The larger animals, such as the mammals, which inhabit the soil and litter from time to time are, because of their size, also omitted from the study.

As a habitat, the litter has some advantages over the soil. It provides, in the decomposing leaves, an abundant food supply for the plant-feeding species and a consequent population for the predators to exploit. Aeration, which is often lacking in heavy clay soils, is no problem in the litter, which is also a well-drained, but moisture-retaining medium, except in periods of dry weather. In addition, the litter provides an "open" habitat through which active animals such as beetles and spiders may move easily.

The conditions prevailing in the litter at any time are a direct result of many environmental and biotic factors, such as the acidity, structure and texture of the soil, aeration, light penetration, food supply and the effects of predators and human activity, but the most influential factors appear to be humidity (depending on the rainfall) and temperature. It may be noted here that the volume of litter in the samples decreased by about 38% between January and August, 1965 and increased by about 30% between September and November, 1965, following the leaf fall. The measurements obtained between December 1964, and January 1966, are shown in Table I (b). Although these figures are of necessity only approximate, due to the difficulty of measuring loosely-packed samples of leaves, it is probable that the variations in the volume are not significant in terms of the litter as a habitat and a food supply. With regard to the temperature factor, the trees have an ameliorating effect, by providing shade in summer and by reducing the prevalence of periods of continual frost or snow in winter.

A considerable amount of research has been carried out on the fauna of the soil and litter, and it has been found (Kühnelt, 1961; Keven, 1962) that the majority of the fauna is highly sensitive to changes in the humidity of its surroundings, and that the greatest variety and numbers are found where the air is permanently saturated, although flooding is generally avoided if possible. This results in marked vertical and horizontal migrations, both daily and seasonal, away from areas where dessication threatens towards a moister environment. There is a similar migration away from conditions of high temperature, which may be related to a reduction in humidity, and also away from low temperatures, although many soil animals can successfully withstand these.

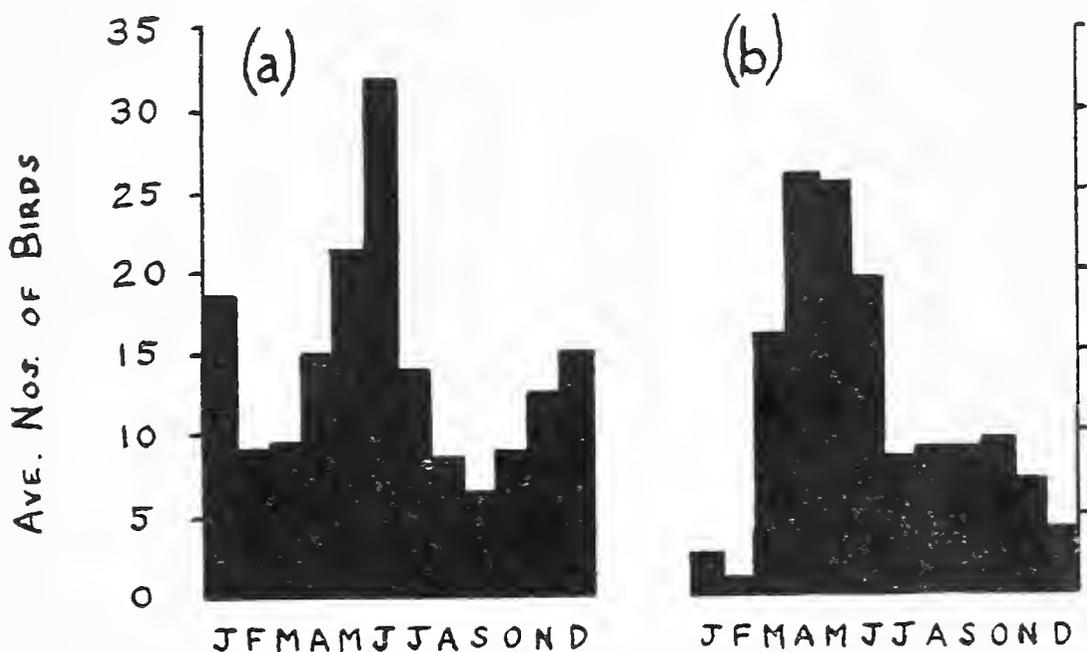


FIG. 1 Average monthly figures for Eastern Wood (40 acres) for (a) the Blackbird during the years 1949-1955 and 1962-1966 and (b) the Robin during the years 1949-1952 and 1963-1966. (From data supplied by Beven (pers. comm.).)

STUDY RESULTS AND CONCLUSIONS

From Fig. 1 (a) it may be seen that, apart from the artificially low figure in September (a result of the already-mentioned difficulties of census work at this time of year), the Blackbird numbers were at a minimum in February and March, when averages of only 9 and 9.5 respectively were counted, approximately 30% of the peak number of 32 in June.

The Robin population reaches its lowest level in January and February, the average numbers then present, shown in Fig. 1 (b), being 2.5 and 1 respectively, only 10% and 4% of the April peak of 26.

An examination of the litter fauna results, shown in chronological order in Fig. 2, indicates that there were peak numbers in March, June, September and November, with low population levels in October, December, January, February and April. From the related graph of the soil surface temperatures (from December 1964, to January 1966,) and the histogram of the condition of the litter, which are also shown in Fig. 2,

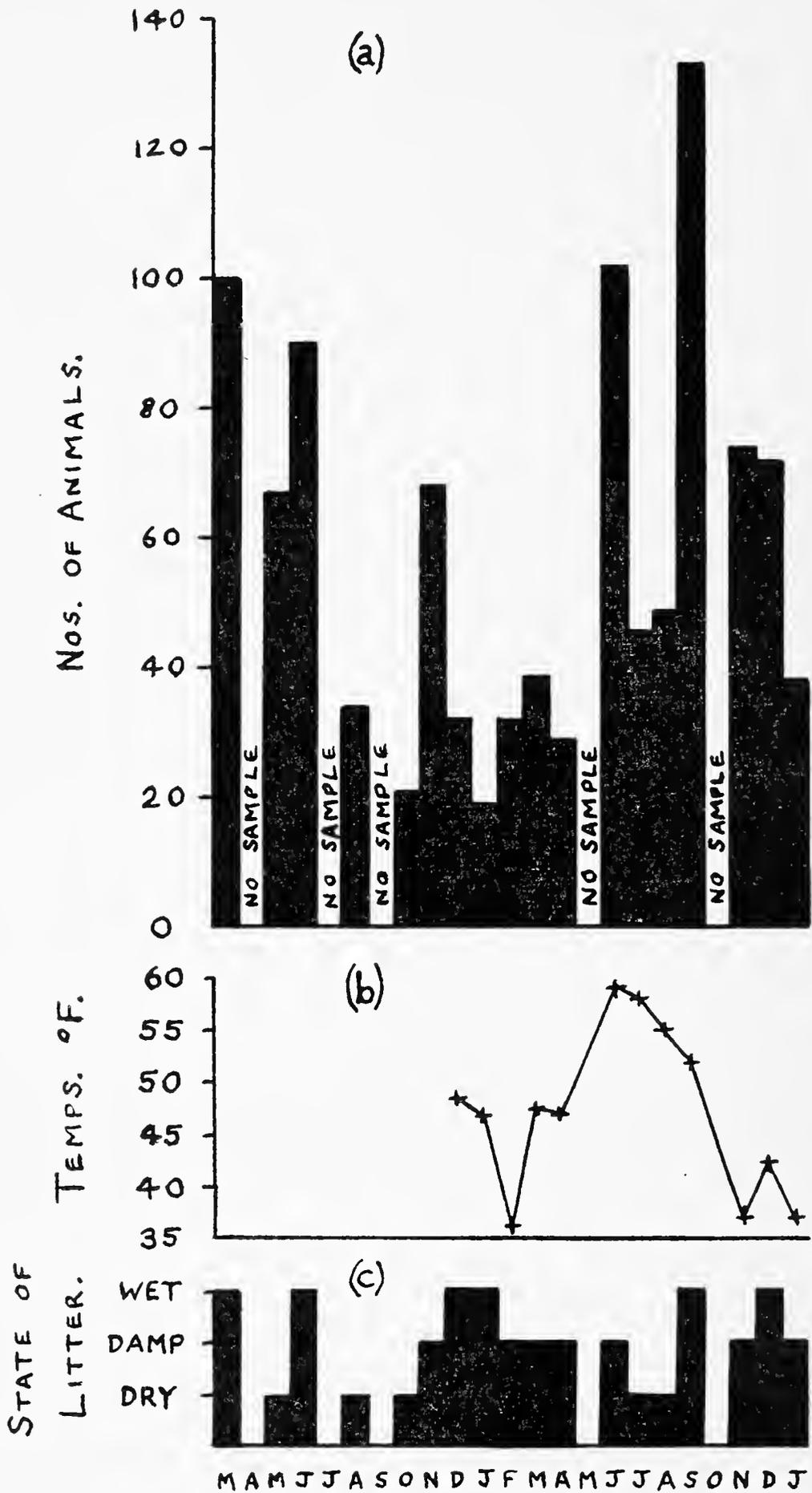


FIG. 2 (a) Total numbers of soil animals in monthly $\frac{1}{4}$ sq. metre litter samples from March, 1964 to January 1966. (b) Temperatures (°F) at the soil surface. (c) Relative estimates of the moisture content of the litter samples.

it appears that the low counts in July and August, 1965 were linked with the dryness of the litter, although the temperatures were not excessively high. The higher numbers in November and December, 1965 are possibly the result of the greater moisture content of the litter, although in these months the temperatures were rather low.

The maximum counts were made in 1965, in June with a peak temperature and a damp litter, and in September with cooler but wetter conditions. For the winter months from November to February, the lowest counts were recorded in December 1964, January and February 1965, and January 1966, the numbers in the samples again varying with the temperature and moisture conditions. The general pattern was, however, reversed in the two sets of December results, the 1964 sample, in mild weather and with wet litter, yielding a lower count than the 1965 sample, when the temperature was low and the litter only damp, conditions under which a minimum count might have been expected. This may be an indication of the influence of factors other than humidity and temperature, although there is always the possibility that it was due to the small size of the samples.

Changes in the volume of the litter may have had some effect on the numbers of animals present, as it appears that they are fairly evenly distributed through the litter, vertically as well as horizontally. The smallest volume of litter was therefore taken to be unity, and corresponding factors calculated for the other volumes (Table I (d)). These factors were then used to arrive at the corrected figures for the total individuals per unit volume for the samples shown in Table I (b), these giving a rather more marked fluctuation in numbers in the early months of the year.

When the results were collated to give average monthly figures for one year, as in Fig. 3, the pattern emerged more clearly, and the relationship between the moisture content of the litter and the population size was even more marked. The lowest population levels occurred in January, February, April and October, and were associated with low temperatures in the first two months and with dry litter conditions in the latter two.

Average figures for three individual groups of animals, *Araneae*, *Enchytraeidae* and *Collembola*, were also plotted, and these gave comparable results.

In a study of the leaf-litter fauna in a Devon oakwood, Shillito (1960) found that the minimum populations occurred in December and January and also during dry weather in June and July, in a pattern that corresponds fairly closely to that in the present study.

From the results obtained, it may be concluded that there is a considerable reduction in the leaf litter population in the first two months of the year, at a time when this is a major food source of the Robin and the Blackbird. This reduction in the food supply may, therefore, be considered to be a significant factor in determining the size of the winter population of ground-feeding birds in Eastern Wood.

The writer unfortunately had to terminate the study on leaving the London area, but in a consideration of future work on this subject, three main points should be borne in mind. The size of the sample was probably too small, and it would no doubt be preferable if this could be increased to at least 1 sq. metre. The biomass of the organisms collected should if possible be calculated, perhaps by measuring the volume and the dry weight of the sample, although this presents many difficulties.

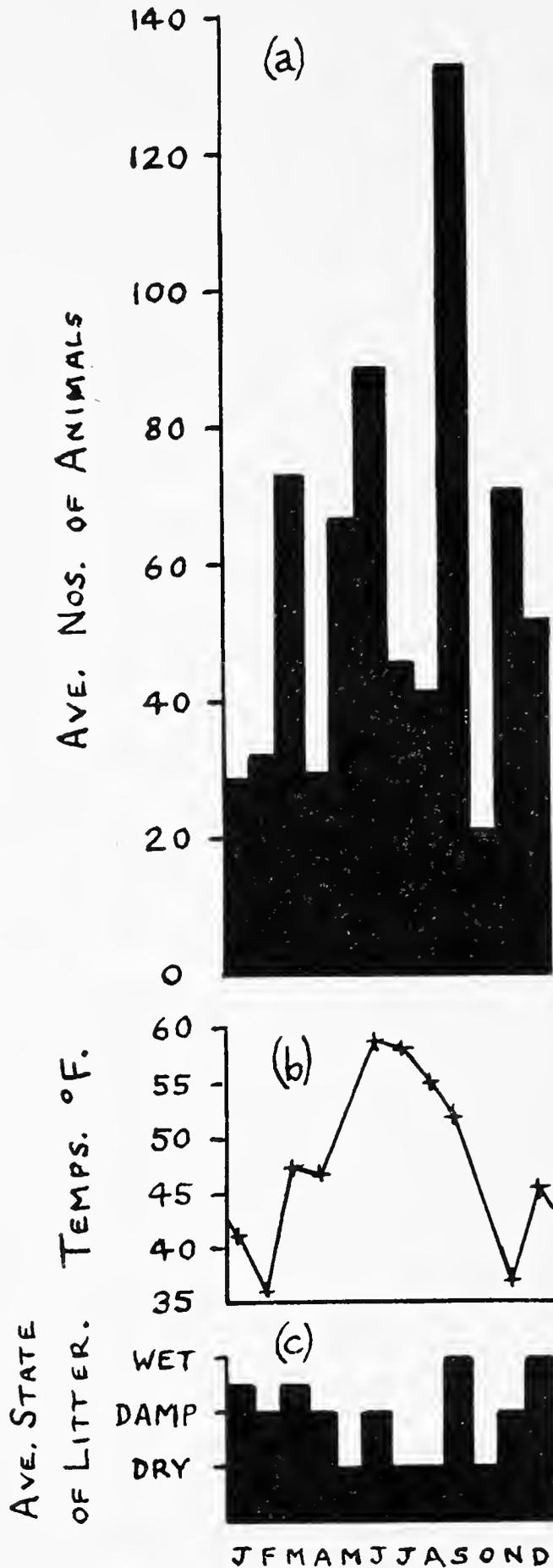


FIG. 3 (a) Average monthly figures for the total numbers of soil animals collected from the $\frac{1}{4}$ sq. metre litter samples. (b) Average temperatures ($^{\circ}$ F) at the soil surface. (c) Averages of the relative estimates of the litter moisture content.

The importance of the moisture content of the litter is an indication that this should be determined more accurately, either by weighing the fresh sample and, after extracting the fauna, drying to a standard temperature (say 100°F) and then re-weighing, or by similarly processing a control sample.

I would like to thank the members of the Ecology Section who have helped me in this study, and in particular Dr. G. Beven and Mr. C. P. Castell for their valuable advice and constant encouragement.

REFERENCES

- BEVEN, G., 1951, The bird population of an oakwood in Surrey (Eastern Wood, Bookham Common). *Lond. Nat.*, **30**, 57-72.
- , 1953, Further observations on the bird population of an oakwood in Surrey (Eastern Wood, Bookham Common). *Lond. Nat.*, **32**, 51-77.
- , 1956, Further observations on the bird population of an oakwood in Surrey (Eastern Wood, Bookham Common). II. *Lond. Nat.*, **35**, 21-32.
- , 1959, The feeding sites of birds in dense oakwood. *Lond. Nat.*, **38**, 64-73.
- , 1963, Population changes in a Surrey oakwood during fifteen years. *British Birds*, **56**, 307-323.
- CASTELL, C. P., 1965, Notes on the geology and soils of Bookham Common. *Lond. Nat.*, **44**, 114-125.
- KEVEN, D. K. McE., 1962, *Soil Animals*. Witherby, London.
- KUHNELT, W., 1961, *Soil Biology*. Faber, London.
- LACK, D., 1943, *The Life of the Robin*. Witherby, London.
- SHILLITO, J. F., 1960, *The general ecology of the Common Shrew*. Unpub. thesis, University of Exeter.
- STEELE, B., 1947, Woodland vegetation of Bookham Common. *Lond. Nat.*, **26**, 82-83.
-

Small Mammal Trapping at Bookham Common

By K. A. J. GOLD

INTRODUCTION

FROM August 20 to 26, 1966, small mammal trapping was carried out at Bookham Common, Surrey, by Richard Randall, Martin Webb and the writer. The object was, by means of a short period of intensive trapping, to determine what changes, if any, had taken place in the small mammal population of the area since the publication of previous work by Harrisson (1956) and Lord (1961).

TRAPPING AREAS AND METHOD

Two areas of the Common were trapped, each with a grid of 25 Longworth Small Mammal Traps, the same type of trap which had been used by the earlier workers. The traps in each grid were laid out at 5 metre intervals and positioned in "runs", a grid therefore covering 25 square metres. The particular areas worked were chosen because of their contrasting vegetation, and were as listed below. Place names and square numbers are those on the survey base-map (Castell, 1943); area letters are from the, still valid, vegetation notes of Jones (1954).

Area 1. Southern Part of Central Wood. (Squares 591, 592, 567, 568; Area K). An area of Oak (*Quercus robur*) woodland, with a shrub vegetation of Hawthorn (*Crataegus* spp.) and Bramble (*Rubus fruticosus* agg.) and with ground vegetation dominated by Bracken (*Pteridium aquilinum*).

Area 2. Part of Bayfield Plain. (Square 73; N.W. part of Area Q). *Deschampsia caespitosa* grassland with scattered Hawthorns and patches of Bramble.

The nest boxes of the traps were provided with dry hay and baited with Quaker Oats. For the first two days, some oats were placed outside each trap: this was to eliminate any "trap shyness"; no pre-baiting was carried out. Animals found in the traps were taken out by inverting the next box in a polythene bag, and then removing the animal from this by hand; the animals were held by the nape of the neck.

The species and sex of all animals caught were determined, and lengths of head and body, tail, hind foot and ear recorded. Weighing was carried out with a British Trust for Ornithology spring balance, each animal being placed in a polythene bag suspended from the balance and the weight of the balance (plus any bedding contained in it) being subtracted from the first reading. Marking was carried out by clipping the fur with scissors.

Both recording and marking were done at the grid, animals being released at the spot at which they had been caught; the traps were visited two or three times a day.

RESULTS

During the survey, four species were caught: the average lengths and

weights of these animals is set out in Table I, below. All lengths are in millimetres; weights are in grams.

TABLE I
AVERAGE LENGTHS AND WEIGHTS OF SPECIES CAUGHT

Species	Weight	Head and Body	Tail	Foot	Ear
Bank vole <i>Clethrionomys glareolus</i> (Schreber)	22.0	75.0	36.5	7.5	7.0
Short-tailed vole <i>Microtus agrestis</i> (Linn.)	21.0	77.0	20.0	10.0	8.0
Common shrew <i>Sorex araneus</i> (Linn.)	8.1	66.5	33.0	5.0	3.5
Wood mouse <i>Apodemus sylvaticus</i> (Linn.)	18.8	73.8	78.5	11.0	12.0

These average lengths all tend to be on the small side if compared with figures from other samples (cf. Southern, 1964), but it must be remembered that the catch was not only low, but also included a number of juveniles, which would have reduced the average figures.

The trapping results are summarised in Table II. The number of each species trapped in each area is shown. "Trap nights" indicates the number of times the traps were cleared multiplied by the number of traps used.

TABLE II
TRAPPING RESULTS, AUGUST 1966

Area	Trap nights	Common shrew	Bank vole	Short-tailed vole	Wood mouse
Central Wood	425	1	3	0	4
Bayfield Plain	325	3	0	3	3
Total	750	4	3	3	7

Three animals were found dead in the traps during the survey, all in the Central Wood and all wood mice—one of which had a broken back. Some traps in the Wood were set off by slugs; others, also in the Wood, had been set off, but the cause, whether accident or animals escaping, is unknown. No parasites were found.

DISCUSSION

Table III shows the 1966 results from Bayfield Plain compared with Lord's 1961 results from the same area. Although the 1966 catch was small compared with those of Harrison (1956) and Lord, a definite habitat preference is shown. Bank voles were caught only in the woodland and short-tailed voles were caught only in the grassland. A larger number of wood mice were caught in the Central Wood than in the Eastern Plain, but more shrews were found in the latter area than in the former. These results agree, as one might expect, with those of the earlier workers.

TABLE III
COMPARISON OF RESULTS OF GOLD (1966) AND LORD (1961)
FROM BAYFIELD PLAIN

Year	Bank vole	Wood mouse	Common shrew	Short-tailed vole	Trap nights
1966	0	3	4	3	325
1961	2	4	5	23	502

The numbers of each species caught in 1961 roughly correspond with those of 1966, with the notable exception of short-tailed voles. There are several possible reasons to explain this last difference: (i) a larger number of "trap nights" in 1961; (ii) a decrease in population due to predation; (iii) a local movement of species; (iv) 1961 was perhaps an exceptionally "good" year for short tailed voles, coinciding with a high point in the population cycle.

From the animals trapped and marked, two bank voles and two short-tailed voles were re-trapped. One of the short-tailed voles was re-trapped three times, on all occasions in the same grid line. This would appear to agree with opinion that the home range of this species is small (Brown, 1956). The range of movement determines the area drawn on by the traps, and a larger ranging species, such as the long-tailed field mouse, will tend to be caught in larger numbers than will a short-ranging species such as the vole. It is possible that the traps were placed at or near the centre of activity of the vole trapped three times.

No definite evidence of predation was found during the period of the survey, but several predators of small mammals were seen. In the woodland the Tawny Owl (*Strix aluco*) was heard every night from several localities, and one of these birds was seen in the Eastern Wood. Barn Owls (*Tyto alba*) were also heard nightly, over the grassland, but none were seen. Other predators observed were a fox (*Vulpes vulpes*) in the grassland area near the L.N.H.S. Research Hut, a grass snake (*Natrix natrix*) at the edge of the Eastern Wood opposite the Hut, and a kestrel (*Falco tinnunculus*) which was on several occasions—but apparently without success—over the Bayfield Plain. It is at least certain that the small mammal populations at Bookham are not without potential predators.

ACKNOWLEDGEMENTS

I should like to thank Richard Randall and Martin Webb for their assistance during the week. My thanks are also due to Mr. P. A. Moxey for making arrangements prior to the survey, to the Nature Conservancy South Eastern Region for the loan of traps, and to the L.N.H.S. for the provision of equipment and the use of the Research Hut. I should especially like to thank Mr. E. F. Youngman, National Trust keeper at Bookham, for his friendly help during the week.

Finally, I am indebted to Dr. G. Beven and Mr. C. P. Castell for reading the manuscript and offering their advice and suggestions.

REFERENCES

- BROWN, L. E., 1956, Movements of some small British mammals. *J. Anim. Ecol.*, **25**, 54-71.
CASTELL, C. P. C., 1943, Bookham Common: Some preliminary observations on the base map and topography. *Lond. Nat.* for 1942, 28-31 and map (fig. 3); map reprinted 1945, *Lond. Nat.*, **24**, 34.

- HARRISSON, J. L., 1956, Some Small Mammals of Bookham Common. *Lond. Nat.*, 35, 9-32.
JONES, A. W., 1954, The Flora of Bookham Common. *Lond. Nat.*, 33, 25-47, and map facing p. 24.
LORD, J. C., 1961, Some Further Results of Trapping for Small Mammals at Bookham Common. *Lond. Nat.*, 40, 73-79.
SOUTHERN, H. N., 1964, *The Handbook of British Mammals*. Oxford.

Recent Excavations in Southwark and Lambeth

By D. J. TURNER, B.Sc., F.S.A.(Scot.)

PRIOR to the 1939-45 war archaeological discoveries in Southwark had been of a chance nature and had occurred mainly during building operations. The Romano-British finds were listed in the R.C.H.M. volume on *Roman London* (1928), and a distribution map of these (Kenyon, 1959) shows that the greatest concentration was close to the river bank and suggests that Roman Southwark was a bridgehead settlement at the Surrey end of the Roman London Bridge. Running back from this was some ribbon development along the roads to Chichester and Kent. A series of cremation burials has been found close to Stane Street (the Roman Road from London to Chichester) and evidence from these and from other discoveries implied that the *floruit* of the settlement was in the second century A.D.

During the Second World War a number of sites in the area were bombed and the buildings that had stood on them were demolished. In 1945 the Surrey Archaeological Society sponsored the formation of the Southwark Excavation Committee to take advantage of the opportunities for research thus afforded.

This Committee organised three seasons of excavation (1945-47), directed by Dr. Kathleen Kenyon, the results of which have been published in full by the Surrey Archaeological Society (Kenyon, 1959). Five sites were excavated by volunteer labour working mainly during bi-weekly evening sessions. The selection of sites (King's Head Yard; 20 Southwark Street; Newcomen Street; Mermaid Court; and 199 Borough High Street) was largely governed by the prospect of ready access to the Romano-British levels thereon. The resources of the Committee were too slender to undertake clearance from the modern surface or to clear accumulated debris. Cellar access was essential, and, as very deep cellars had removed all the archaeological levels, cellars of moderate depth, unencumbered by debris, were selected.

These excavations supported the suggestions given by the distribution map of earlier finds regarding the character of Roman Southwark. First century material was found to exist but no structure of this period was proved. There was a greater abundance of finds of second century date, including the remains of buildings, and so it was deduced that occupation

in the area increased at that time. The absence of buildings of any period on sites back from the road showed that it was probably the road frontage alone that was built up.

The selection of cellars for the 1945-47 excavations meant that very little information about the medieval occupation in the area was discovered. Medieval Southwark could be inferred, however, to be similar in geographical character to Roman Southwark—a bridgehead settlement plus ribbon development alongside the roads.

After 1947 the Excavation Committee ceased to be active. Since then the L.C.C. and the London Survey Committee have published two volumes of the *Survey of London* (Roberts and Godfrey, 1950; Darlington, 1955) which have detailed the history of the area and described buildings of architectural interest. In 1959 the Surrey Archaeological Society published the results of the S.E.C. excavations.

In the late 1950's renewed building activity in Southwark was accompanied by further demolition and site clearance and by considerable commercial excavation. Mr. P. V. R. Marsden, of the staff of the Guildhall Museum, did much work watching building sites and noting discoveries. His most important discovery was that of a Roman barge on the site of New Guy's House in 1958. This was followed up by a limited archaeological excavation, directed by Mr. Marsden, in which several members of the L.N.H.S. took part (Marsden, 1965). The boat had sunk in a lost backwater of the Thames—now known as Guy's Channel—whose existence had not previously been suspected. The presence of this channel ruled out one of the possible courses in this area of the Roman road from the Kent coast to London (Watling Street)—the line shown on Miss Kenyon's map already cited—and suggested that a course linking with Stane Street near St. George's Church was probable.

In late 1961 permission to develop the site of 199 Borough High Street was being sought. This had been the site of one of Dr. Kenyon's excavations and traces of Stane Street had been found together with the possible remains of a bridge across an easterly running stream. There was a certain amount of ambiguity in the results of this excavation—only a very limited area had been available for exploration—and it was felt that further work here was desirable, before building took place. A joint project was proposed by the Cuming Museum and the L.N.H.S.

It rapidly became obvious that the resources of these bodies were insufficient for such a project and that for this reason, as well as others, it was advisable to broaden the basis of sponsorship for archaeological activities in the Borough. Other individuals had begun to work on parallel lines to Mr. Marsden and the London and Middlesex Archaeological Society were taking an interest in discoveries in the area. The Surrey Archaeological Society continued to maintain their interest which dated back to 1854 when their inaugural meeting had taken place in Southwark.

A meeting of interested parties was convened and it was decided that a new Southwark Archaeological Excavation Committee should be set up to organise excavation in Southwark. Professor Frere, who had been the Secretary of the first S.E.C., was present at the meeting. The new committee comprised representatives of the two county societies, the Cuming and Guildhall Museums, with Mr. Marsden and the writer as field staff. The writer also represented the L.N.H.S. The Committee has been financially supported by the two County societies, the Southwark Borough Council, the L.N.H.S., and other bodies. The first activity of

the Committee was the organisation and financing of excavations at 199 Borough High Street.

Excavations were carried out between August 11 and September 3, 1962 and on the following weekend. Professional labour was employed to break concrete and to do some filling in, and the Southwark Civil Defence Corps helped clear rubble from one trench. The rest of the work was done by volunteers, over 100 of whom took part. Mr. Marsden and the writer acted as joint directors and Mr. John Vockings undertook the bulk of the site supervision.

The interpretation of the results of the excavation can still only be tentative as the material from the site has not yet been fully sorted and annotated—a circumstance which also prevails for all the subsequent S.A.E.C. excavations. The majority of the finds derived from the King's Bench Prison buildings and their successors which occupied the site from late medieval times onwards. A length of probably late medieval wall was exposed and two "tanks", one cylindrical, the other rectangular, of pre-Tudor date, were also found. A complex of 16th century rubbish pits was disclosed by one trench. One of these pits contained a sequence of bone objects, including a series of unusual chessmen. A late 17th century rubbish pit in another trench produced a closely dateable group of clay pipes and pottery together with a considerable amount of animal bones, principally cattle skulls.

The Romano-British finds from the site tend to confirm the views held previously regarding the occupation of the area. No structural remains were found although a spread of Roman tiles in one place and a fragment of painted wall plaster nearby probably indicated that a building stood in the vicinity. The quantity of Romano-British material found was much greater in the trenches close to the Borough High Street than in those further away, which was as expected. A trench cut at some expense and with much difficulty across the line of Stane Street suggested by Dr. Kenyon's work on the site produced a possibly Claudian ditch and a series of pits. A layer of gravel cut through by pits could have been part of the road but the feature was not conclusive. The layers were, unfortunately, truncated here by modern disturbance at approximately +4' 6" O.D.

The excavations at 199 Borough High Street were expensive—the three week season cost more than the three years' campaign of Dr. Kenyon—but they did provide a basis of logistic experience for the Committee. The expenditure included much capital spent on tools which remained available for later digs. This tool collection has been steadily added to since. One chastening fact remains: the site of 199 Borough High Street has still not been redeveloped.

The second site to be excavated by the S.A.E.C. was on the site of the medieval Bishop of Winchester's Palace. The excavation was directed by Dr. Francis Celoria, the then Field Officer of the London Museum, and supported mainly by volunteers from the Thames Basin Archaeological Observers Group.

The site available for excavation, which was redeveloped after the end of the dig, was immediately west of the west wall of the Winchester Palace Hall (Clink Street) which contains the famous rose window (Toy, 1946; Roberts and Godfrey, 1950). The aim was to trace and record as much of the ancient footings as possible and to collect stratified medieval debris. The Palace was known to date originally from the 12th century

but remains from the 14th century were expected to predominate. The site was thought to have been the kitchen and well-house area.

Finds from the medieval layers were much as expected. Beneath post-Tudor footings were layers of 13th to 16th century kitchen waste with considerable pottery in small pieces. Below this was a thick post-Roman ragstone wall which may have been a river wall and clearly pre-dated the Palace.

Below the surviving walls of the Palace and the ragstone wall were silty layers containing debris thrown towards the Thames from Roman times to *circa* 1200. To the south of these deposits were found traces of a Romano-British building which could not be properly explored because of lack of finance or time to break the concrete covering it. Finds of pottery, leather, plaster, etc. from the Roman period were considerable and more could have been recovered had more elaborate pumping apparatus been available. The finds indicated considerable occupation in the first century A.D. This discovery may well lead, when the material has been fully examined, to some modification of the previously held view that Roman Southwark was principally a second century affair.

The Winchester Palace excavations lasted from November 1962 to April 1963 and volunteers worked hard through a particularly bitter winter to recover valuable information which may materially alter our picture of Roman Southwark and will contribute to our understanding of medieval pottery sequences. It is to be regretted that shortage of time and money prevented the site being fully explored.

Later in 1963 a site at the corner of St. Thomas's Street and Joiner Street, near London Bridge Station, was investigated. Mr. Marsden directed the work and Messrs. Farrant, Vocking, Dawson and Muller acted as site supervisors. The aim was to examine the edge of the channel previously found under New Guy's House and which appeared likely to pass through the site as it ran towards the Thames.

Marshland was found to be cut by a series of Romano-British drainage ditches, succeeded by silt layers of later Romano-British date and, in the 16th or 17th century, a barrel-well or pit. The Romano-British finds included a piece of bronze with the figure of Cupid in relief and fragments of leather shoes. No trace of the Guy's Channel was discovered and it had to be concluded that it passed to one side.

The excavations at 199 Borough High Street and at the Winchester Palace site had been largely supported by inexperienced and untrained volunteers. The need and desire for some sort of training school was apparent and in the summer of 1963 the S.A.E. organised what was to be the first of a series of three annual training schools. The first school was directed by Dr. Celoria and lectures were given at the Cuming Museum and practical training on a bombed site at 78/80 Borough High Street. The course was a great success.

The excavations at 199 Borough High St. and at the Winchester Palace site had been largely supported by inexperienced and untrained volunteers. The need and desire for some sort of training school was apparent and in the summer of 1963 the S.A.E.C. organised what was to be the first of a series of three annual training schools. The first school was directed by Dr. Celoria and lectures were given at the Cuming Museum and practical training on a bombed site at 78/80 Borough High Street. The course was a great success.

The site chosen for the practical work was on the west side of the

Borough High Street, all former scientific excavations having been on the east side. Unfortunately there had been a great deal of disturbance in the area chosen, though this perhaps provided a more valuable exercise in the disentanglement of stratification than an uncontaminated site would have done. A considerable quantity of Romano-British, medieval and later pottery was found and a 17th century brick sump.

A second training school took place during the following August. In addition to lectures at the Cuming Museum, practical instruction took the form of an excavation on a site in Hopton Street close to where the Swan Theatre of Shakespeare's time had stood. Nineteenth century cobbles and an 18th century brick floor had to be penetrated before 16th and 17th century levels could be reached. However, finds petered out as layers of silt were removed. Much pottery had been found, some of it unusual and specialists were helped to gain knowledge about surface levels in 17th century Southwark.

In the same year the S.A.E.C. organised an excavation in Emerson Place which was directed by Mr. G. Dawson of the Cuming Museum. These showed that the marsh beside the Thames behind Bankside was not reclaimed here until about 1600, and fifty years later a little further south. On the Park Street side houses were first built soon after 1600 and were made of wood. Three of these superimposed on each other were found underlying an 18th century brick building. These timber buildings were the first to be found in Southwark of this date. Associated with the wooden buildings was a well made out of a barrel. In the 18th century house was a well which was still in use when the house was demolished in the 20th century. On the south part of the site along Sumner Street, the marsh was converted into gardens *circa* 1650 and was not built on until *circa* 1830 when pressure for housing close to London was more intense than it is even today.

Later in 1964 excavations under the direction of Dr. Celoria, started on a site in Lant Street. Mr. James Thorn was site supervisor. Two areas were excavated. One was the site of a little alley called Peggotty Place and the other was in the basements of shops which fronted on to Borough High Street. About 12 ft. of man made deposits were revealed, dating mainly from the 16th to 19th centuries. There was an intermixture of Romano-British sherds and small finds at the base, among which were a bone pin similar to one found at Mermaid Court and a pair of folding beam scales comparable to ones found in the City and at St. Albans. A prolific 17th century rubbish pit and the remains of a possibly 17th century house were also found. Some medieval material was also found adjacent to the Borough High Street, including a group of late 13th century pottery which comprised three baluster jugs, four cooking pots and a floor tile.

Also during 1964 the staff of the Cuming Museum carried out rescue work on a number of sites where commercial development was taking place. Traces of Romano-British occupation were found at London Bridge Approach and what may have been the remains of a Roman road near St. George's Church. This appeared to be running on the line of Tabard Street and could well have been part of Watling Street just before it joined Stane Street on the line of Borough High Street. Finds from a road trench at the corner of Lavington Street and Great Suffolk Street included tin-glaze and stoneware wasters and kiln furniture. It is probable that these came from the Gravel Lane Pottery which is shown

on Rocque and Pine's map of 1737-46 as being approximately 200 yards south of the Lavington Street site. Other finds included lead-glazed red earthenware and a series of clay tobacco pipes dating from 1670 to 1780.

Archaeological activities in Southwark in 1965 began early in the year with the start in January of an excavation under the direction of Dr. Celoria, which was carried out every weekend until October. The site was that of Potters Fields in Vine Lane, off Tooley Street in the then Borough of Bermondsey. The area excavated covered 3,000 square feet. Brian Bloice and Maurice Seeley acted as site supervisors.

The upper levels of the site contained the remains of late 19th century flats and this made excavation in certain areas difficult. Fragments of red brick walls of an 18th century warehouse known to have been on the site were plotted. The only earlier structure on the site was a late 16th century brick building with a hard rammed chalk floor and a cobbled area. An 18th century granite cobbled road with drainage gulleys also crossed the site: apparently this went out of use when the 19th century flats were built. The most interesting material from the site, however, was found in an extensive dump of kiln wasters etc. found below the 18th century levels.

Altogether a thousand bags (estimated at two tons weight) of pottery were excavated: of this about 75% was from the 17th century tin glaze kiln dump. The remainder was post medieval domestic pottery.

The material from the kiln dump consisted of unglazed and glazed wasters and of kiln material. The pottery included tiles and fragments of figurines as well as drug jars, porringers, sack bottles, mugs, saucers, chargers, etc. The drug jars were in many sizes, some decorated in designs in blue and yellow. The mugs had blue and purple mottled glaze and the chargers had various designs. For all the glazed specimens there were ample unglazed "biscuit" examples to correspond. Tiles included ones with a leaping fox, running dog and jester in polychrome design and many geometrical designs. One unfired tile bore a camel design painted on—glazed but not fired. The evidence from Vine Street has still to be assessed and the assessment will depend on a statistical analysis being carried out at Keele University.

No evidence of occupation before the 16th century was found—before then the area appeared to be wet and marshy. Documentary evidence indicated that from 1618 onwards there was at least one and possibly more delftware kilns near the riverside downstream from London Bridge. The delftware found seems to date from *circa* 1620-1700 and presumably came from one of these kilns. The pottery, especially the tiles, has strong affinities to Dutch material and a number of Dutch potters are known to have been working here at this period. The material excavated is very important because it is some of the earliest delftware to be produced in England and from these kilns most of the other delftware industries in England, at Lambeth, Liverpool and Bristol, were established. The evidence would suggest that the kilns did not survive after 1700, if that late.

The third S.A.E.C. training school was directed in 1965 by Mr. Maitland Muller of the Cuming Museum. Again the school included practical work at an excavation, this time at New Guy's House. The excavation extended beyond the period of the training school. Two shafts were sunk.

The first to the north of New Guy's House, was 15 ft. deep and was sunk to obtain more information about the backwater known as Guy's

Channel in which Mr. Marsden had found the sunken Roman barge in 1958. Other previous finds in the vicinity had included "old breakwaters" found in 1859 and some years before "an old barge". These finds seemed to indicate that the channel extended at least this far. However, in the excavation no trace of the channel was found and it had to be concluded that it bends north-eastwards further south. Provisionally the early part of the sequence may be interpreted as the Romano-British land surface of open ground covered by a gravel flood deposit in the accelerated sinking of the Lower Thames Valley in late Romano-British and early medieval times (Woodley, 1960) and then by clays as it gradually silted up through many centuries after the sinking slowed down again.

The second shaft sunk in the vicinity was to the south of New Guy's House on the site of the Roman barge found by Mr. Marsden. The shaft had to be sited to one side of the projected centre line of the boat. Fragments of boat timbers were found, including a rib. It was possible to deduce from the position of these timbers that the boat was smaller than had been estimated by Mr. Marsden and that the barge was probably only 40 ft. long instead of the estimated 60 ft. Above the boat was found a complex of stakes, beams and boards, presumably of 16th century date, which might be shuttering of a drainage ditch for the reclamation of the last vestiges of the silted up channel beside the Bermondsey marsh which had degenerated into Maze Pond.

Nineteen-sixty-five also saw the formation of the Southwark and Lambeth Archaeological Society (S.L.A.S.). Largely as a result of Dr. Celoria's initiative a large group of volunteers had been carrying out processing work on the finds from various excavations. Few of these had felt moved to join any of the existing archaeological societies and in the autumn of 1965 they formed themselves into their own, low-subscription, society which has received a grant from the Lambeth Borough Council. The members of this society have formed the bulk of volunteers at subsequent S.A.E.C. excavations as well as continuing their processing work.

The end of 1965 also saw the start of an excavation that was destined to take more than a year. This was on the site of Kennington Palace and was organised by the S.A.E.C. with the aid of substantial grants from the Ministry of Works and was directed by Mr. Dawson.

In the later 11th century the manor of Kennington was owned by Teodric the goldsmith who presumably lived in London. The manor passed from the De Fortibus family to the De Warrennes, Earls of Surrey, and in 1304 John de Warrenne died there, which would suggest that a house of some pretensions must have existed there by then.

In 1316 the manor was granted to the king, Edward II, and thus became royal for the first time. After a number of grants to favourites, Edward III granted it to his eldest son, Edward, the "Black Prince", as Duke of Cornwall, and between 1346 and 1362 he built himself a palace there which seems to have consisted of a hall with service rooms, a large number of chambers, bakehouse, chapels, stables and gardens. The palace remained royal for the next two hundred years and was often a residence of the Kings of England who entertained there, sometimes on a lavish scale. In 1531 Henry VIII ordered that the palace be demolished to provide building materials for Whitehall Palace.

The manor remained part of the Duchy of Cornwall estates and still does today. A series of leases were granted of the site of the palace: a manor house of brick was built there in Tudor times, and a barn. In

1775 the leaseholder was granted the right to sublet and in the next forty years the site was developed for housing. In 1876 the manor house of Kennington was finally demolished.

The excavations produced finds from the eleventh to the eighteenth centuries. An irregular burial of the eleventh or twelfth century was found as was a ditch associated with a few post holes from the time of the manor house which occupied the site before the Palace was built. However, remains of the Palace itself were more substantial.

Parts of six buildings belonging to the palace built by the Black Prince were found. The most important was the Hall which was about 82 ft. by 50 ft. It was built completely of stone, probably chalk faced with greensand and with mouldings, many of which were found, also in greensand. It had an undercroft floored with rammed chalk and roofed with a stone vault supported by pillars. The main room would have been at first floor level and the undercroft served as a store. One end was cut off by a partition wall, built partly of brick. At its west end was the King's or Prince's Chamber, also built in stone. Its foundations are so massive that they probably supported a two-storey building. At its south-west corner was a tower which had been converted into a garderobe tower and a very small lean-to added. This building was also floored with rammed chalk which may have served as the basis for a tiled floor since a few fragments of tiles were found. The roofs of both of these buildings may have been in lead but all the others were tiled.

Other buildings of the Palace complex included two subsidiary chamber blocks which were half timbered on stone foundations with walls made of lath and daub. One of them had a rammed chalk floor and one end was partitioned off to form an inner chamber. Close to these subsidiary chamber blocks fragments of an important building were found. This was also completely stone built and was oriented north-south. It was probably of a different date from the subsidiary chamber blocks. Also found was a long out-building, half timbered on stone foundations with a roof possibly supported on a central row of posts, which was probably the stables of the Palace. The amount of pottery and general domestic rubbish from the period of occupation of the Palace was extremely small, probably because the standard of cleanliness was high and the rubbish carted away from the site.

Remains of the brick manor houses built after the demolition of the Palace in 1531 were found. The stables were partially rebuilt for use as a barn. After the manor houses were demolished in about 1750 a large amount of delftware and stoneware kiln waste was dumped on part of the site.

The excavations at Kennington Palace did not absorb all the S.A.E.C.'s resources during 1966 and small sites were investigated at Park Street, in the Borough High Street next to Borough Market, at Newington Butts, and in Lambeth High Street.

At the Newington Butts site, immediately south of the Metropolitan Tabernacle, only a small trench could be cut. In spite of its proximity to the medieval village of Newington no features earlier than the end of the 18th century were found. The excavations showed that the area must have been liable to repeated floodings until the nearby streams were converted into sewers in the 19th century.

The Park Street excavation was also of a very restricted nature due to the bulk of the site being covered by concrete. The excavation showed

that the area was not used, even for farming, until the 16th century, but some light was thrown on the later history of the area.

At the Borough Market site, modern cellars had removed all post-13th century layers apart from one late- or post-medieval rubbish pit. The conclusions from this site still remain to be worked out but an early medieval ditch was found which cut through a burnt layer that contained first century pottery. A possible robbed wall, earlier than the ditch, was also found.

A site in Lambeth High Street was examined under the direction of Mr. B. J. Bloice. Eighteenth and 19th century foundations were found sealing a furnace and layers of ploughsoil with early post-medieval pottery in them.

In addition to these activities, several members of S.L.A.S. and others have been keeping a watch on builders' trenches and other commercial and public utility excavations and have recovered archaeological material of all periods from the Romano-British to the present day. Sorting continues. The L.N.H.S. Archaeological section is processing the pottery from the 199 Borough High Street excavation and groups of S.L.A.S. members are dealing with finds from the other sites. Additional recruits are urgently needed for all this work.

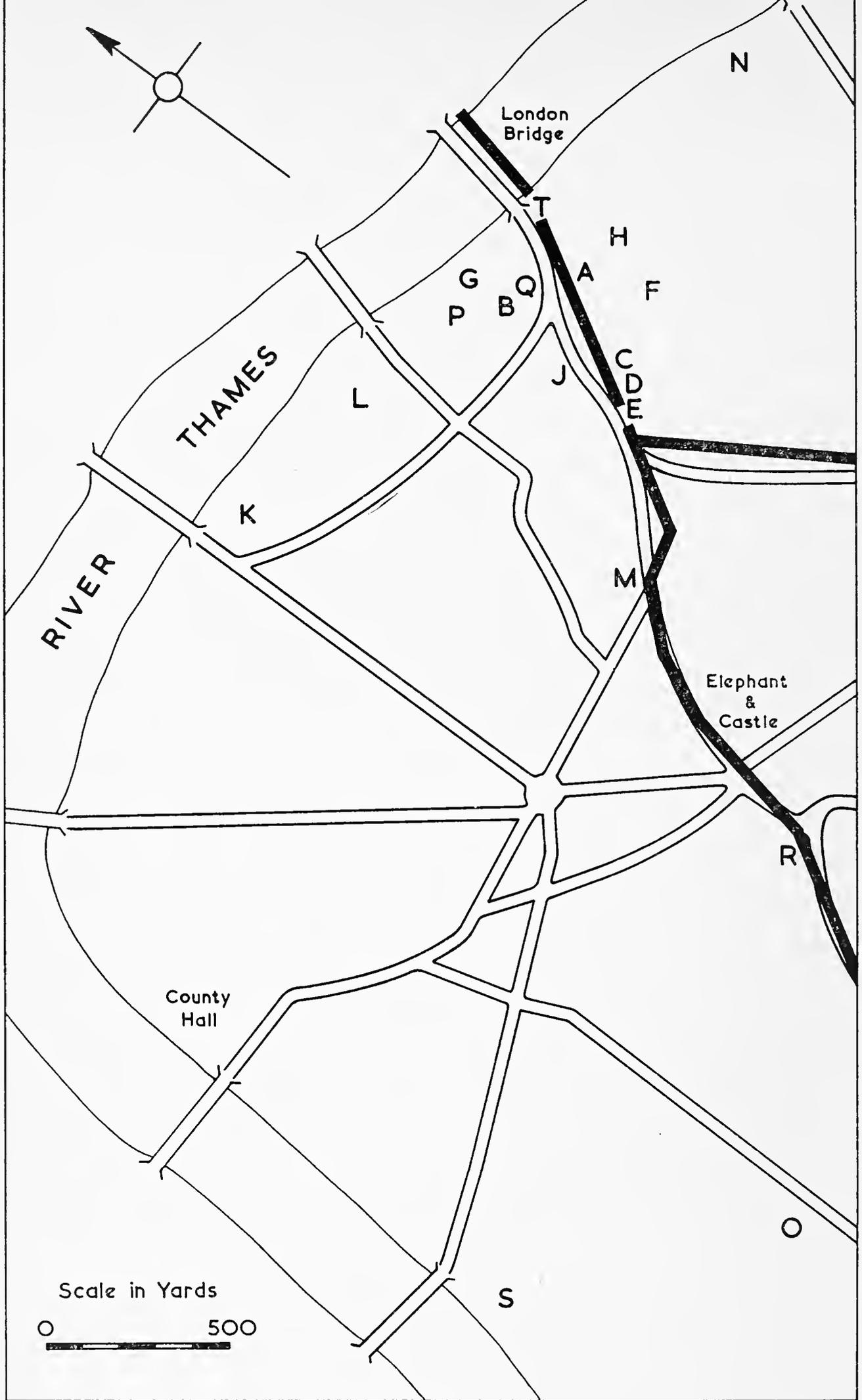
In five years the S.A.E.C. has sponsored seventeen excavations on sites covering a wide range of archaeological periods from Roman Southwark through medieval palaces to the early delftware industry and the growth of the suburb in the seventeenth and eighteenth centuries. When the excavation reports are finally published the value of this work will be fully evident.

The Southwark Archaeological Excavations Committee is continuing to sponsor research in the area and at the time of writing excavations in advance of the redevelopment of London Bridge approach has just begun. It is hoped that this will produce evidence about Roman London Bridge and help to solve the problem of whether or not the south bank of the Thames was embanked in Roman times.

The writer wishes to thank the directors of the excavations and the Southwark Archaeological Excavation Committee for their help in the preparation of this note.

REFERENCES

- DARLINGTON, Miss I., 1965, St. Georges Fields, *Survey of London*, 22.
KENYON, Dr. KATHLEEN M., 1959, *Excavations in Southwark*, Guildford.
MARSDEN, P. V. R., 1965, "A Boat of the Roman Period Discovered on the Site of the New Guy's House, Bermondsey, 1958". *Trans. London and Middlesex Archaeological Society*, 21, Part 2, 118-131.
ROBERTS, Sir H. and GODFREY, W. H., 1950, Bankside, *Survey of London*, 22.
ROYAL COMMISSION ON HISTORIC MONUMENTS, 1928, *Roman London*, London.
TOY, S., 1946, "Winchester House, Southwark". *Surrey Archaeological Collections*, 49, 78-81.
WOODLEY, G. M., 1960, "The London Thames and the Changing Levels of the Land and the Sea". *Lond. Nat.*, 40, 115-120.



KEY

- | | |
|---|--------------------------------------|
| r. Kathleen M. Kenyon's Excavations, 1945-1947. | J. 78/80 Borough High Street, 1963. |
| A. King's Head Yard. | K. Hopton Street, 1964. |
| B. Ingledew and Davenport site, Borough Market. | L. Emerson Place, 1964. |
| C. Newcomen Street. | M. Lant Street, 1964-65. |
| D. Mermaid Court. | N. Potters' Fields, Vine Lane, 1965. |
| E. 199 Borough High Street. | F. New Guy's House, 1965. |
| Discovery of Roman boat by Mr. Marsden, 1958. | O. Kennington Palace, 1965-67. |
| F. New Guy's House. | P. Park Street, 1966. |
| Excavations sponsored by the S.A.E.C., 1962-1967. | Q. Borough Market, 1966. |
| E. 199 Borough High Street, 1962. | R. Newington Butts, 1966. |
| G. Bishop of Winchester's Palace, 1962-63. | S. Lambeth High Street, 1966-67. |
| H. Joiner Street, 1963. | T. London Bridge approach, 1967. |

Visible line of the Roman Roads known as Stane Street and Watling Street

Conservation in the London Area, 1966

DAPHNE C. HERSEY, Dip.Geog., F.R.G.S., M.B.O.U.

NINETEEN-SIXTY-SIX has been another busy year for the Conservation Committee and a year which has also seen a number of ideas come to fruition which could mean future changes in London's fauna and flora, particularly with regard to the Lee Valley and Epping Forest areas.

Our Committee acts mainly as a watch dog—keeping an eye open for future developments which could have adverse effects on Natural History interests in the London area. We hope that all members of the Society will act as conservationists and watch their own areas carefully. To further the cause of conservation, our last secretary, Mr. L. Manns to whom we owe much, organised a most successful conservation course at Juniper Hall last February under the direction of Dr. Palmer Newbould of University College, with the Warden of the Field Centre and representatives of the University of Sussex and the local County Trusts.

Lectures were given on techniques of conservation—how to appraise the value of sites, the use of maps and photography, land use and management, soil profiles, vegetation, and animal habitats. Dr. Gay of the Nature Conservancy gave a lecture on administration problems in conservation and there were some interesting field excursions to places of ecological value. Another similar course is to be held in May, 1967, this time at the Haslemere Museum again under the direction of Dr. Newbould but organised by the University of London in conjunction with the Society. At Juniper Hall, in April 1967, a week's course will be held by the Centre staff, on the Principles and Practice of Nature Reserve Management.

This Committee is well supported by the Home County Naturalists Trusts who send representatives to its meetings, as does the Council for Nature. Their initiative and co-operation have enabled much of our conservation work to be brought to a successful conclusion.

The Lee Valley Liaison Committee of the Council for Nature with Mr. Crudass acting as Chairman and Mrs. Small as secretary has completed a revised report on sites suitable for nature reserves in the Valley and presented it to Mr. Woolcott, the future director of the Lee Valley Authority, at County Hall. Following this meeting the Committee are now preparing a more detailed review of the possibilities of Nazing Marsh as a reserve and field study centre. If this is approved and adopted by the Lee Valley authority we may see a viable centre established there in the next few years for both school children and amateur adults.

Nature conservation in London made headlines and aroused sufficient interest for radio and television coverage, with the transference of the rare snail, *Laciniaria biplicata*, from its haunts at Chiswick, near Barnes Bridge (scheduled for re-development) to new sites at Eton College and Chiswick House. This operation, carried out on April 17 by the Conchological Society of Great Britain under the direction of Dr. Verdcourt was most successful. The colony proved larger than was at first thought and a third of the snails are to be used for breeding purposes. A nucleus was also left behind and it is hoped that this will survive.

Apart from vigilance against the claims of outside authorities, watch must be kept on indiscriminate shooting. Kent, with its marshes in the Swanscombe area suffers much from this, and in Middlesex, at Bayhurst

Wood, great prominence was given by local newspapers to a report that the last two badgers in the county had been shot by vandals. Recently the watchful members of the Hertfordshire and Middlesex Trust have removed snares from the same area. From Hampstead we can report brighter news. A group of local residents have bought Turner's Wood and have approached the Society for help and advice in management. The site of the Winter Aconite in Rexford Copse, Hertfordshire, is not, as was feared, in danger from gravel digging. Scratch Wood, however, is threatened not only by a spur road from the motorway, but by lack of proper management which is endangering the rarer plants by the unrestricted growth of rank shrubs. This is the kind of work undertaken so well by the Conservation Corps of the Council for Nature. Agreement is approaching with the London Borough of Harrow over the correct management of Stanmore Common so that the habitats of breeding birds and rare moths may be preserved. The London Borough of Hillingdon has been questioned about the planting of sycamore and poor quality trees in oak-hornbeam coppice at Copse Wood, Ruislip.

Essex, very much on London's doorstep, is under constant pressure. Roadworks in Epping Forest at Waterworks Corner threaten an oak-hornbeam community and much correspondence has taken place in an endeavour to minimise the danger. There is a proposal to build a ring road from the Dartford Tunnel through the Wake Arms area and this must be carefully watched. Proposals to build a camping site in that part of Hainault Forest with the greatest natural history interest are contained in a Bill to go before Parliament and this is causing us grave concern at present. In Epping Forest the Deer survey is continuing and numbers of Fallow, Red, Roe and Muntjac deer have been estimated. The large stretches of woodland also make this area very suitable for work on the National Badger Survey.

In Surrey also there has been much activity. The public inquiry regarding the extraction of gravel at Kempton Park was held in the Spring, and the Society supported the views presented by the Surrey Naturalists' Trust. As a result it is expected that the gravel will be extracted in such a way as to cause a minimum of disturbance to the heronry during the critical active months.

The Trust is hoping to find a flooded gravel pit in the Society's area that could be conserved for its natural history interest. The new Godstone Pond Nature Reserve which is being managed by Mr. R. Clarke and an active local committee, had a visit from the Council for Nature's Conservation Corps during the summer to reduce the amount of *Typha latifolia* (reedmace) which dominates much of the pond.

Other Surrey sites which have been on the Committee's agenda during the year are Gatton Orchid Bank, Selsdon Wood, Box Hill, Banstead Wood, East Sheen Common and Esher Common. The Esher Common site was involved in the proposed southern route of the Esher By-pass considered by a Public Inquiry held in the Autumn, at which the Society was represented by Mr. F. L. Reynolds, the Surrey Trust's Conservation Officer. We are asking that, if the Southern route is approved by the Minister, certain safeguards should be adopted to reduce the interference to the wild life and flora of the Common. It was suggested that the badger colony should be moved from Round Hill to another suitable site at a season when they have no young, and well before the construction of the by-pass.

As the review of sites of special scientific interest in Surrey is now being undertaken, the Surrey Trust would be glad to hear of any areas of biological interest worth considering. It is hoped that members of the Society may be able to help. In particular, biological information is required about Mitcham Common.

For the Kent Trust for Nature Conservation, 1966 was a year of continued but unspectacular progress. Membership increased further, assisted by a number of public meetings held in the county in the early part of the year.

At the Annual General Meeting in April, the present name of the Trust was adopted. Like many other County Trusts, it was found that the former name gave the impression that its work appealed only to the limited number of people who would regard themselves as "naturalists".

During National Nature Week the Trust's first nature trail was opened at Hothfield Common near Ashford; some 1,500 people followed the trail, including fifteen parties from eight schools.

The reserve at Downe had an uneventful year, with a number of visits by parties from schools.

At Ruxley Gravel Pit the year was a very busy one. Sixteen organised parties from natural history societies and schools visited the reserve. Conservation work has been carried out by a party from a girls school and by parties of permit-holders. A great deal of trouble has been caused by the presence of up to thirty caravans on the A20 verge just outside the reserve. Much trespassing and damage to wild life, trees and undergrowth has resulted.

In November discussions took place with the Parks and Planning Departments of the G.L.C. and a list of sites suitable for the study of natural history in the Boroughs of Bexley and Bromley has been supplied. Discussions are also taking place with a view to the greater use of the Trust's reserves for educational purposes.

In connection with the introduction of exotic species, there was some correspondence with the G.L.C. concerning Mrs. Peggy Jay's scheme to introduce foreign butterflies to the London Parks. However it was discovered that Press reports of the scheme were considerably exaggerated.

In January of this year the Nature Conservancy held a Conference of Trusts in the South East of England to consider conservation in the Greater London area. Mr. Crudass represented our Society and our Chairman, Mr. Milne Redhead was also present.

The most important fight for conservation in this country has been that to save the unique area of Upper Teesdale from flooding by a reservoir. The Society gave its support to a mass meeting held on October 20 at Caxton Hall and a collection made at the meeting also helped with the heavy financial commitments.

In the work of Conservation in the *Society's* area there is no room for complacency. Pressure on sites is all too common. Here all members can help. If you know of a site of natural history importance or interest, let us know; if it is threatened tell us and work with us and your local county trust to see that as much as possible of the best of London's vanishing Countryside with its fauna and flora is saved for future generations.

Techniques in Ecological Surveys

Residential Weekend Course

DURING 1965 I suggested to the Nature Conservation Committee and to Council that a weekend course on the techniques used in ecological surveys might be of considerable interest and benefit to members, particularly those connected with conservation work.

As this was something of a new venture for the Society, and in order to ensure a sufficiently large response, it was decided to open the course to members of the Naturalists' Trusts in the home counties and other natural history societies.

The course was duly arranged for the weekend of February 25-27, 1966, and was held at Juniper Hall Field Centre, Dorking, Surrey, by kind invitation of the Warden, Mr. J. H. P. Sankey. We were most fortunate in obtaining the services of Dr. P. J. Newbould of University College, London, as lecturer in charge of the course, assisted at various times during the weekend by Dr. F. B. O'Connor, also of University College, London, Mr. F. L. Reynolds, Conservation Officer of the Surrey and Sussex Naturalists' Trusts, Mr. D. T. Streeter of the Sussex Naturalists' Trust, and Mr. Sankey.

On the evening of Friday, February 25, 24 people assembled at the Field Centre for supper, following which Dr. Newbould gave an introductory lecture on the purpose and type of site surveys, the physical background, the use of published material, and the preparation of reports.

The Saturday morning was devoted to lectures on biological aspects—soils, vegetation and animal habitats—and these were demonstrated in the field at Leith Hill and Juniper Bottom in the afternoon. Dr. P. A. Gay, Nature Conservancy Regional Officer, S.E. Region, gave an informative lecture in the evening on administrative problems in conservation.

The members were divided into two groups on Sunday morning, one going to Sheep Leas, East Horsley, and the other to Ashurst Valley, near the Field Centre. At these places the students were given the opportunity of putting theory into practice by carrying out rapid appraisals of the sites and making notes on their findings. These were used in the afternoon session when the morning's results were compared and the course was discussed and evaluated. Tea followed, after which the members dispersed.

Although it appeared that most of the students were already connected with many survey and conservation activities, it was agreed that this experimental course had been most interesting and instructive, and that many had gained an insight into some of the problems involved in carrying out ecological surveys and had learned some of the answers and techniques. The general opinion was that courses of this nature were both useful and desirable, not only for the information gained but also for the stimulus of contact and discussion, and that similar courses should, if possible, be held in the future.

I would like to express my gratitude to the course lecturers who devoted all or part of their weekend to our instruction, particularly to Dr. Newbould on whom most of the burden fell, and also to Mr. Sankey and his staff for making our stay at the Field Centre so pleasant and comfortable.

L. MANNS

Working Party on Mapping

Progress Report for 1966

ON October 15, 1965 the Recording Map Working Party proposed that a permanent working party be set up to co-ordinate the mapping activities of the Society. The Council approved this proposal and appointed Mr. H. A. Sandford as its first Maps Officer. The Working Party on Mapping is to provide a forum where all interested members and Sections can meet to discuss their problems, co-ordinate their work and generate new schemes.

Four very lively meetings have been held so far and they revealed a considerable and increasing desire on the part of members to present the results of their work in map form. In this issue of the *London Naturalist* appear Mr. E. B. Bangerter's *Calystegia* maps and a report by Mr. P. C. Holland on the progress made by the Botany Section in their very important mapping scheme. Other work, in hand or projected, includes the mapping of lichens, fish, bugs, snails and false scorpions.

Among the topics that provoked much interested discussion were the methods of mapping rarities so that their exact location was not revealed, the possibility of publishing transparent overlays of soil, rainfall, urban areas and so forth to be used with printed distribution maps and the adoption of standard scales and symbols for the Society's maps so that they can be more easily compared.

The Working Party exists to serve all members of the Society. The Maps Officer will send to those interested a list of the maps held by the Society and can put them in touch with other members engaged in similar projects.

H. A. SANDFORD

Obituaries

HAROLD MUNRO FOX 1889-1967

SOME Presidents enjoy their titles without making any return to the Society which elects them, but this could never be said of our late President, Professor Munro Fox. He was much more than a nominal head, for he took a deep interest in all the many things which the Society does. From the time of his election in 1944 he gave numerous lectures to our members; he not only attended field meetings, particularly to Epping Forest, but he also led some memorable ones to the shore near Brighton, a favourite collecting place of his. He would listen with patience and interest to what old and young members had to say, questioning them closely especially when they had comments to make on the habits or the occurrence of crustacea. The library, too, owed much to him, for it was he who arranged for its temporary home at Queen Mary College before it was assembled in the present quarters.

Born in London in 1889, he was a day boy at Brighton College where he acquired his interest in biology from himself for the subject was not taught at the school. His student life at Gonville and Caius College, Cambridge was followed by work at Plymouth and Naples, before he took a post at the Royal College of Science, Kensington, under Professor MacBride. But the First War broke out a year later. His experience of the Middle East while he was in the Army infected him with a desire to see more for after a short time at the Royal College of Science he returned to Egypt to join the staff at Cairo University. Indeed though he was elected to a Balfour Studentship at Cambridge in 1920 he did not return to England to take it up until 1923. Even then he returned to investigate the fauna of the Red Sea in order to discover the extent to which Mediterranean forms had migrated through the Suez Canal. In 1927 he was appointed Professor of Zoology at Birmingham University, coming to London, in the Chair at Bedford College, in 1944. Fox remained in London after his retirement in 1955 for he became an Honorary Research Fellow at Queen Mary College and then a Fellow of that College. In particular he continued until his death to edit *Biological Reviews*, the journal published by the Cambridge Philosophical Society which he had formed and moulded since its inception into the international journal of high standing that it is to-day.

Despite the fact that much of his work lay in the study of respiratory and other pigments in animals, the appearance of a laboratory physiologist was a deceptive one. His interest in physiological topics sprang from his dedication to natural history for he sought in his experiments explanations of the biological adaptiveness of the animals he studied. Though perhaps best known for his investigations on the haemoglobin of *Daphnia*, he worked on many other invertebrates.

In his very active retirement Harold Fox turned to the study of those very small crustacea, the ostracods. This enabled him to travel about Britain visiting puddles, ponds and springs, both temporary and permanent in his search for species of these creatures. This work revealed clearly his skill as a microscopist for he performed the most beautiful and delicate dissections of these tiny animals. His interest in the mechanics of

microscopy was one with his general interest in techniques and his determination thoroughly to understand any one before he used it. His search for the habitats of the tiny animals enabled him to continue his natural history interests. Even at home he kept marine animals in carefully tended aquaria maintaining them for long periods with very simple arrangements.

Apart from his Fellowship of the Royal Society, Fox's contributions to zoology were recognised by the presentation of the Gold Medal of the Linnaean Society in 1959, and the latest honour, the Darwin Medal of the Royal Society was conferred on him a few months before his death. But honours came from abroad as well and in 1965 he was made a Honorary Doctor of Philosophy of the University of Bordeaux. Indeed his considerable linguistic ability made him known to a number of workers in other European countries.

Harold Fox will be remembered as a dedicated zoologist whose meat and drink was his subject. His opinions on many matters were entirely individual, and obdurately held, often to the discomfort of others, but opposition to them never aroused his animosity. His courtesy and his, at times, intractable nature made us hold him in a peculiar affection. He will be missed.

J. D. CARTHY

DR. A. ANDERSON, M.D., D.P.H.

IT is with great regret that we record the death on June 7, 1966 of Dr. A. Anderson, M.D., D.P.H., Chairman and one of the founder members of the South-West Middlesex Section (formerly Group) of the London Natural History Society.

The South-West Middlesex Group of the London Natural History Society was formed at a public meeting held in Hounslow on February 25, 1952. From its inception Dr. Anderson took a great interest in the activities of the Group. In 1953 he was appointed to the Committee, becoming Chairman in 1955, a position he held until his death.

When the Group undertook the survey of Cranford Park in 1953 Dr. Anderson was responsible for the ornithology section of the survey. In 1955 much of the preliminary work in connection with the series of natural history lectures held in Hounslow in conjunction with the Extra Mural Department of London University fell to him.

However it will be as a regular attender at all meetings of the Group that "The Doctor" will best be remembered. His chief love was ornithology, but he was always interested in the botanists' and entomologists' discoveries and to discuss them with the finder. All, whether young or old, will remember his kindness, thoughtfulness and help at meetings. He will be sadly missed by members of the South-West Middlesex Section for a long time to come.

E. EVERITT
H. M. SMITH

Books

Flora of Hertfordshire, by J. G. Dony. 112 pages, 56 pages of maps with bibliography, index and 15 pages of photographs. Hitchin Urban District Council, 1967. 42s.

The publication of this new Flora of Hertfordshire reveals a highly significant departure from tradition and provides a likely pattern for future County Floras. This is the first to appear of the new generation of local Floras, in which recording has been on the basis of *tetrads* (grid squares of 2 km. × 2 km.), a system that clearly owes its origin to the B.S.B.I. Distribution Maps Scheme. It is in use for a number of other Floras in course of production and has been adopted for the L.N.H.S. plant mapping scheme.

As a result of this detailed method of recording the reader can see at a glance the distribution of 696 species of plants in the county, shown in the form of individual "minimaps". Although these are small (4.3 cm. × 3.0 cm.), it is possible after minimal practice to spot without difficulty any tetrad in which the reader is specially interested. The minimaps are prefaced by a series of larger scale maps in which factors such as altitude, rainfall and geology are illustrated. Some people may regret the absence of a general complete topographical map, but this would doubtless have increased the cost of production.

In the account of the species, which follows the sequence of Dandy's *List of British Vascular Plants* (1958), with later nomenclatural corrections, each species has the following information: English name, first record, status and some indication of its frequency and distribution (based on records made between 1951 and 1966). Lists of localities are only given for the rarer species, but full references are given to the minimaps and the associated habitat studies. There are no less than 109 of the latter, 28 of which are illustrated by photographs. Through this medium a broad spectrum of the whole range of plant habitats in Hertfordshire is demonstrated, and the characteristic vegetation of each major geological region is clearly displayed. The habitat studies are not an innovation, but follow on from the author's earlier *Flora of Bedfordshire* (1953). This greatly facilitates the comparison of the vegetation of these neighbouring counties. We are aware that some field botanists will miss the traditional lists of localities, but the combination of minimaps, species accounts and habitat studies allows ample scope for both field and armchair botanising.

The treatment of the difficult critical genera varies in scope. In some, such as *Ulmus*, quite a lengthy description of the problems is given, but in no case is the subdivision of taxa followed to the ultimate in pursuit of its doubtfully logical conclusion. In this way the needs of the average field botanist are catered for, while the minority with specialist interests in these groups may regret the absence of more detailed information.

The Flora is confined to the Vascular Plants, but Dr. Dony cites recent lists covering some of the Cryptogamic groups. A dozen pages of introductory matter provides a historical review of work on the botany of the county.

Those who are already familiar with Dr. Dony's work on Bedfordshire, will have expected that this sequel would be a work of the highest standard. In this they will not be disappointed, and the published work will probably even exceed their expectations. Despite the fact that this review has been

prepared at short notice so that it could be included in this issue of the *London Naturalist*, we feel most confident in recommending this Flora at the amazingly low price of two guineas, which in itself almost disarms criticism. In the face of so many excellent features, we feel that this is not the place for a carping enumeration of printing errors, of which we have in fact noted very few. Suffice it to say that the production of the book is in keeping with its high scientific standards.

Dr. Dony is to be greatly congratulated for again showing that local Floras can be completed and published in a reasonably short space of time, and further that they can be produced at a price acceptable to the vast majority of potential users. He has provided London botanists with a much needed Flora to bring Pryor's work of 1887 right up to date. We echo Dr. Dony's hope that the enterprise shown by Hitchin Urban District Council in publishing the Flora will be followed by other Local Authorities, who may note that undertaking of this kind can be both a service to their communities and also a viable financial investment.

E. B. BANGERTER
J. F. M. CANNON

Poisonous Plants and Fungi in Colour, by Pamela M. North. Blandford Press, 1967. 25s.

The purpose of this attractive little book is "to help people recognise plants and fungi which could be harmful . . ." and it has been published in co-operation with the Pharmaceutical Society of Great Britain. The illustrations include 80 pages of reproductions of photographs in colour of which some are very good indeed; others will provide little assistance in recognising the species they illustrate.

The botanical part of the text appears to be a compilation and many of the entries are misleading. This is especially the case with habitats where, for example, the reader is given no clue to look for Green Hellebore in woods and copses, or Pasque Flower on chalk and limestone grassland, but will search for Annual Mercury in pastures. There are too many useless statements of the type of "Docks (*Rumex* spp.) are weeds recognised by their size and abundance in the waysides". Even the title shows a sad disregard of botanical accuracy since fungi are, of course, plants.

The author seems more at home in dealing with the poisonous constituents and the effects of poisoning and it is assumed that with the blessing of the Pharmaceutical Society this attains a higher standard. Even so it seems to underestimate the requirements of the ordinary user of the book. The poisonous constituents are commonly described in the broadest terms, such as "glycosides" or "alkaloids", without mention of substances now familiar to most readers. For example, one looks in vain for atropine and hyoscyamine under Deadly Nightshade and hyoscyamine and hyoscine under Henbane. The book is well printed and produced but otherwise hardly of the standard expected in Blandford books.

J. E. LOUSLEY

The Country Life Guide to Trees in Britain, by A. W. Holbrook. 248 pages, many line drawings, 56 photographs. Country Life, 1966. 21s.

This is a compact guide to the various species of tree found in this country. Major Holbrook has written and illustrated this book with the

hope of stimulating an interest in trees in people who have not previously been aware of their beauty: he has arranged the descriptions of the species on an alphabetical basis rather than by families, a scheme which should overcome some of the technical difficulties which tend to intimidate beginners.

The line drawings of the parts of the trees are terse sketches conveying all the necessary information required. Unfortunately, Major Holbrook has not always been so successful with the camera as he is with the pen, and whilst some of his photographs are good, in others the definition is poor, so that valuable information about the shape and habitat of the trees is less clear than it might be.

The inclusion of an account of the life cycle of trees introduces the concepts of fertilization, seed dispersal and the effects of competition in terms that can easily be understood, and the illustrated guide at the end is useful for quick identification. The glossary is rather short, but most technical terms are explained in the text.

Finally, this book should be judged in terms of the readership at which it is aimed; for the beginner, it provides a reasonably priced illustrated guide which should stimulate a further interest in the subject.

PATRICIA MOXEY

Companion to Flowers, by David McClintock. G. Bell and Sons. 30s.

For those who like to know the derivation of names this is a fascinating book. It is full of curious information and interesting and amusing anecdotes, all told in a most readable manner. As one would expect from Mr. McClintock the botanical detail is accurate, and beginners may be helped to resolve many puzzles of nomenclature. The illustrations though few, are charming and the very full index is excellent.

In these days of increasing specialisation, it is refreshing to meet with a broad-minded naturalist like the author, who brings ecology into his book and urges plant-lovers to "find out about the interdependence of the vast variety of organisms that make up our world.

L. M. P. SMALL

The Terrestrial Mammals of Western Europe, by G. B. Corbet. 64 pages, 16 plates. G. T. Foulis and Co. Ltd., London, 1966. 56s.

As has been the trend in the last decade for bird watchers to go and study the birds of Europe in the field, so also there has been increasing interest to get to know, at least some of Europe's mammals. Until the appearance of Dr. Corbet's book there has been nothing so compact as this volume, that would enable it to be taken on one's travels, at least not in English. So the arrival of this concise book on the mammals of Europe, is more than welcome.

For two-thirds of its 264 pages a detailed account of all the mammals found west of Russia is given, excluding the bats, seals and whales, with also an account of the world distribution of each family and genus. The preliminary chapters are most informative, especially the one on "Structure of Mammals", which will ensure that in my copy the pages will be well thumbed. I think that this chapter will prove invaluable to all amateur mammalogists and maybe to some professionals! There is a rather brief but nevertheless useful chapter on mammal ecology, under the headings of food, competition, predators and parasites and pathogens.

There is no doubt that this book should be on everyone's bookshelf, if they are more than just interested in Europe's mammals, and after all, despite political motives, we are part of Europe.

By way of a small complaint, the photographs although reasonable are hardly adequate, illustrating only seventeen species. The addition of some more plates would have made the book even more valuable. The reviewer for one learns a great deal from an illustration but has difficulty in visualising an animal from text; the Spiny Mouse is an example. These are only minor points and in no way detract from the service that Dr. Corbet has done by providing us with this excellent book.

B. P. PICKESS

Silently, by night, by Russell Peterson. 227 pages, many line drawings. Longmans, London, 1966. 30s.

British naturalists who are interested in bats take pains to correct those who talk about "the Bat", and point out that there are fourteen species of bats in Britain, showing a considerable diversity of structure and behaviour. The chief aim of this book is to extend this process to the rest of the world and to give a glimpse of the almost incredible diversity and abundance of bats throughout the world.

No knowledge of the subject is presumed and the style is light, although in parts somewhat verbose and circuitous. The author writes from personal experience of the bats of North America and of Australia and New Guinea, and elsewhere draws upon reliable sources to produce an authoritative, if cursory, review of the subject. All the principle families are discussed and chapters are devoted, under fanciful titles like "Giants in paradise", to such topics as reproduction, migration, carnivorous species and echolocation, although the last receives rather disappointingly brief and superficial treatment.

The many line drawings illustrating details of structure add considerably to the interest. Altogether this is an enjoyable book providing an unusually happy blend of entertainment and instruction.

G. B. CORBET

On Aggression, by Konrad Lorenz. 273 pages. Methuen, London, 1966. 30s.

Dr. Lorenz, already well known for two excellent books on animal behaviour, "King Solomon's Ring" and "Man meets Dog", has now related his knowledge and experience of animal behaviour to that of man. His latest book to be published in English, "On Aggression" is an absorbing comparative study of aggressive behaviour in Man and other animals.

Dr. Lorenz first draws on his wide knowledge of animal behaviour, in particular the social behaviour of geese and fish to demonstrate how aggressive behaviour in animals is canalised into precise pathways, specifically evolved to enable the species to take maximum advantage of its physical and social environment. He emphasises how seldom it is that aggressive behaviour leads to physical damage or the killing of individuals. Rather it is redirected into ritual aggressive display patterns which are of selective value in distribution of the species, of breeding success and in cooperative social behaviour such as pack formation. The resultant ritualisation of aggressive behaviour patterns can be seen in some animals

to become the means by which much of their social behaviour is organised.

With this as a background, he considers in the phenomenon of aggression in Man whose evolution, now primarily a cultural process rather than a result of Darwinian natural selection, can be redirected into the defence of cultural values. Herein lies our greatest danger. Man, who is capable of dedicating himself to the highest moral and ethical values, relies on a redirected mechanism of aggression to do so, even though this may mean that he kills his brother while being convinced that he does so in the defence of those values.

Dr. Lorenz' erudite essay on the biology of aggression in Man reveals the breadth of man's instinctive heritage as an animal, however deeply he may wish to conceal it under his cultural heritage as a man. It is a book that all biologists should read.

R. C. FISHER

Shell Nature Lovers' Atlas, by James Fisher. 48 pages, including maps. Ebury Press and Michael Joseph. London, 1966. 7s. 6d.

This atlas, which deals with England, Scotland and Wales, consists of a series of maps at a scale of 90 miles to the inch, showing sites of interest to the "nature lover". This term has been taken to include all those with an interest in natural history, including archaeology and geology. Zoos, Botanic gardens and National Parks are included as well as all types of nature reserve, field centre, etc.

Sites are marked on the maps by reference numbers which are listed on the opposite pages against a brief note on the interest, access and ownership. An index to sites and a list of useful addresses are also included.

A book of this sort, dealing with a large number of facts, is liable to suffer from some degree of inaccuracy, the extent of which is difficult to assess. Generally, the information is brief and to the point, but it is disturbing that of the sites in north London checked by the reviewer, the information for one was incorrect and another totally omitted.

Despite such inaccuracies, the book is certain to be of value to most field naturalists when visiting areas unknown to them. It should be added that the maps are of no use for locating the precise position of sites but that a National Grid Reference is given for each locality.

STUART E. CROOKS

The Library

CLASSIFICATION of the Society's Library is almost complete and compilation of the catalogue can be commenced in the near future. The work is being done by the staff of Ealing Central Reference Library who have to combine this with their ordinary work and are further hampered by the physical difficulties of the building.

The policy of the Library Committee was outlined in the last London Naturalist and basically states that the material in the Library should be of a scientific nature, preferably publications not readily available to the ordinary naturalist and works pertaining to British localities. Journals fall most definitely into these categories and work has continued to extend and complete the runs of local, national and international periodicals in the Library. In response to requests, a list of the journals has been prepared for publication.

Books purchased or donated to the Library this year include:—

- Ashby, M. *An Introduction to Plant Ecology*. 1965.
 Audubon, J. J. *The Birds of America*. 1937.
 Chandler, T. J. *The Climate of London*. 1965.
 Corbet, G. B. *The Terrestrial Mammals of Western Europe*. 1966.
 Elton, C. S. *Pattern of Animal Communities*. 1966.
 Hudson, K. *Industrial Archaeology*. 1965.
 Jackson, B. D. *Guide to the Literature of Botany*. 1964.
 Janus, H. *The Young Specialist Looks at Molluscs*. 1965.
 King, J. E. *Seals of the World*. 1964.
 Lack, D. *Population Studies of Birds*. 1966.
 McClintock, D. *Companion to Flowers*. 1966.
 Merrifield, R. *The Roman City of London*. 1965.
 Oldroyd, H. *Natural History of Flies*. 1964.
 Radford, M. C. *Birds of Berkshire and Oxfordshire*. 1966.
 Rutgers, A. *Birds of Europe: Volumes 1 and 2*. 1966.
 Ruttledge, R. *Ireland's Birds*. 1966.
 Tebble, N. *British Bivalve Seashells*. 1966.
 Tutin, T. G. and others. *Flora Europaea: Volume 1*. 1964.
 Vaurie, C. *The Birds of the Palearctic Fauna: Non Passeriformes*.
 Wigglesworth, V. B. *Life of Insects*. 1966.
 Williamson, K. *Fair Isle and Its Birds*. 1965.

Thanks are due to the Staff of Ealing Central Reference Library and Ealing Library Committee for their continued co-operation and administrative assistance and for their financial help particularly with binding of journals.

Periodicals in the Library of the London Natural History Society

THE journals listed here are obtainable for *reference only* at Ealing Central Reference Library, Walpole Park, London, W.5, during the library opening hours listed on the Society's programme. A current library ticket, obtainable from the General Secretary, is required for the use of the library.

Except where runs are very broken, individual parts are not listed. The following abbreviations and symbols are used:—

- † runs kept up to date by addition of new parts as published.
- c.c. current copy only retained.
- * circulated by sectional reading circles and current copy never available in the library.
- n.l.p. no longer published. If a journal has changed its name or amalgamated with another, this is indicated where it applies.

Examples:—

Antiquity: vol. 1 1927† a continuous run from 1927 to date.

Animal Behaviour: vols. 3-10 1955-62 these volumes are in the library, but no further additions after 1962.

Animal Ecology (British Ecological Society): vol. 6 1937 (vol. 7 pt. 2 1938; vol. 8 pt. 1 1939)†* a continuous run from 1937 to date *except* for parts inside brackets. Reading circle.

Contents: in most cases, the content of a journal is apparent from its title or the name of the producing association. In nearly every other case, especially the journals of local natural history societies, the content is of a general nature and cannot be individually defined.

Additions: further additions will be listed in the Library Report in the next *London Naturalist*. Journals which members may wish to dispose of would be welcomed by the Society's Librarian, especially if they fill gaps in runs already in the Library.

Acta Botanica (Societis pro Fauna et Flora Fennica): no. 1 1925†.

Acta Zoologica (Societis pro Fauna et Flora Fennica): no. 1 1926†.

Advancement of Science (British Association for the Advancement of Science): no. 1 1939 (no. 3 1940; no. 4 1941; no. 18 1967).

Alpine Garden Society Bulletin: vol. 28 pt. 1 1960 (vol. 31 pt. 2 1963) vol. 34 pt. 2 1966. *Yearbook*: 1960; 1966.

Amateur Entomological Society Bulletin: vol. 2 no. 15 1937; vol. 4 nos. 34, 36, 40 1939; vol. 6 nos. 68, 69, 71, 72, 1945; vol. 7 1946†.

American Museum of Natural History: see *Natural History*.

American Ornithologists' Union: see *Auk, The*.

Animal Behaviour: vols. 3-10 1955-62.

Animal Ecology (British Ecological Society): vol. 1 pt. 1 1932; vol. 2 pt. 1 1933; vol. 4 pt. 2 1935; vol. 6 1937 (vol. 7 pt. 2 1938; vol. 8 pt. 1 1939)†*.

Antiquity: vol. 1 1927†.

Ardea (Nedeslandshe Ornithologische Unie): vol. 40 pt. 1/2 1952 (vol. 40 3/4 1952; vol. 41 1953; vol. 48 1960; vol. 49 pt. 1/2 1961; vol. 50 pt. 1/2 1962)†*.

Audubon (National Audubon Society of America): c.c.

Auk, The (American Ornithologists' Union): vol. 66 1949 (vol. 81 pt. 4 1964; vol. 82 pt. 1 1965)†*.

- Bardsey Bird and Field Observatory Report*: no. 2 1954 (no. 3 1955)†.
- Bedfordshire Natural History Society: see *Bedfordshire Naturalist*.
- Bedfordshire Naturalist* (Bedfordshire Natural History Society): no. 1 1946†.
- Bird Banding* (North Eastern Bird Banding Association, U.S.A.): vol. 20 1949 (vol. 31 pt. 1 1960; vol. 32 pts. 2, 4, 1961; vol. 33 pts. 1, 2 1962; vol. 34 pt. 2 1963)†*.
- Bird Life in the Royal Parks* (Royal Parks Committee Report): 1930†.
- Bird Lore* (National Audubon Society of America): vols. 8-17 1906-1915 n.l.p.
- Bird Migration* (British Trust for Ornithology): vol. 1-vol. 2 pt. 4 1958-1963 (all parts published).
- Bird Notes* (Royal Society for the Protection of Birds): vol. 23 pts. 1, 3-9 1947-49; vol. 24 1949-51; vol. 25 pts. 1, 6-8 1951-55; vol. 26 1953†.
- Birds* (Royal Society for the Protection of Birds): vol. 1 1966†.
- Bird Sanctuaries in Royal Parks Committee Report: see *Bird Life in the Royal Parks*.
- Birds in London: see *Bird Life in the Royal Parks*.
- Birds of Leicestershire and Rutland* (Leicestershire and Rutland Ornithological Society): 1941 (1946; 1950; 1951)†.
- Birds of Nottinghamshire* (Trent Valley Bird Watchers): no. 2 1944†.
- Birds of Warwickshire, Worcestershire and South Staffordshire: see *West Midland Bird Report*.
- Bird Study* (British Trust for Ornithology): vol. 1 1954†.
- Birmingham and District Bird Club: see *West Midland Bird Report*.
- Birmingham and West Midland Bird Club: see *West Midland Bird Report*.
- Birmingham Natural History Society Proceedings*: vol. 15 1921†.
- Birmingham Natural History Society and Philosophical Society: see Birmingham Natural History Society.
- Botanical Society and Exchange Club Report* (now Botanical Society of the British Isles): vols. 7-13 1924-1947.
- Botanical Society of the British Isles Proceedings*: vol. 1 1954†. *Yearbook*: 1949-53 n.l.p. See also *Watsonia*.
- Botany, Journal of*: vols. 27-80 1889-1942 n.l.p.
- Bristol Naturalists' Society Proceedings*: vol. 8 pt. 2 1936†.
- British Association for the Advancement of Science: see *Advancement of Science*.
- British Birds*: vol. 1 1907†.
- British Bryological Society Report*: vol. 4 pts. 4, 5 1944, 1946. *Transactions*: vol. 1 pt. 2-vol. 5 pt. 1 1948-1966.
- British Ecological Society: see *Animal Ecology*; *Ecology, Journal of*.
- British Empire Naturalists' Association: now British Naturalists' Association.
- British Fern Gazette* (British Pteridological Society): vol. 9 supplement to pt. 1 1960; pt. 3 1962; pt. 7 1966.
- British Lichen Society: see *Lichenologist, The*
- British Mycological Society News Bulletin*: vol. 1 1967†.
- British Naturalists' Association: see *Countryside* and *Countryside Monthly*.
- British Ornithologists' Union: see *Ibis*.
- British Pteridological Society: see *British Fern Gazette*.
- British Trust for Entomology: see *Entomologist, The*.
- British Trust for Ornithology Report*: nos. 1-12 1935-45; no. 16 1949; no. 24 1957; no. 25 1958; no. 30 1963†. *Bulletin*: nos. 1-21 1935-46;

- no. 25 1947 n.l.p. *Newsletter*: no. 1 1964†. See also *Bird Migration; Bird Study*.
- Calf of Man Bird Observatory Report* (reprinted from *Proceedings of Isle of Man Natural History and Archaeological Society*): 1962†.
- Cambridge Bird Club Report*: no. 2 1928 (no. 16 1941; no. 17 1942)†.
- Cape Clear Bird Observatory Report*: no. 2 1960†.
- Cardiff Naturalists' Society Transactions*: vol. 61 1928†.
- Carlisle Natural History Society Transactions and Papers on Lakeland*: vol. 1 1909†.
- City of London Natural History Society Transactions*: 1891-1913 (now The London Natural History Society).
- Copeland Bird Observatory Report*: no. 4 1958†.
- Cornwall Bird Watching and Preservation Society Report*: vol. 1 1931†.
- Cotteswold Naturalists' Field Club Proceedings*: vol. 27 1939†.
- Council for British Archaeology Bibliography*: 1958; 1959.
- Council for Nature Newsletter*: nos. 1-25 1958-64 n.l.p. *Press Bulletin*: nos. 1-53 1960-64 n.l.p. See also *Habitat; News for Naturalists; Wild Life Observer*.
- Countryside* (British Empire Naturalists' Association): vol. 12 no. 1 1941 (vol. 12 no. 2 1942; vol. 13 no. 12 1947; vol. 14 no. 10 1948; vol. 18 no. 2 1954)†.
- Countryside in 1970 News*: no. 1 July, 1966; no. 2 January, 1967.
- Countryside Monthly* (British Naturalists' Association): vol. 1- vol. 6 pt. 9 1910-14 (now *Countryside*).
- Coventry and District Natural History and Scientific Society Proceedings*: vol. 1 1930†.
- Croydon Microscopical and Natural History Club: see Croydon Natural History and Scientific Society.
- Croydon Natural History and Scientific Society Proceedings*: vol. 3 pt. 2 1881-82; vol. 4 pts. 2-6 1893-99; vol. 6 pt. 2 1904-05; vol. 7 pt. 3 1913-14; vol. 8 1914†.
- Darenthis* (Lewisham Natural History Society): no. 1 1961†.
- Derbyshire Ornithological Society Report*: 1945 (1960/61)†.
- Devon Bird Watching and Preservation Society Report*: no. 9 1936 (nos. 12-15 1939-43) no. 27 1954)†.
- Dorset Natural History Society and Antiquarian Field Club Proceedings*: vol. 28 1907; vol. 33 1912 (now Dorset Natural History Society and Archaeological Society).
- Dungeness Bird Observatory Report*: no. 1 1957†.
- Ecology, Journal of* (British Ecological Society): vol. 24 pt. 1 1936 (vol. 24 pts. 2, 3 1936; vol. 26 1938; vol. 27 1939)†*. Index 1913-1932.
- Edinburgh Bird Bulletin*: (Scottish Ornithologists' Club): vol. 6 no. 6- vol. 8 no. 6 1956-58 (now *Scottish Birds*).
- Endeavour* (Imperial Chemical Industries): c.c.
- Entomological Society of the South of England: Journal*: vol. 1 nos. 1-4-1932-33. *Transactions*: vols. 5-8 1929-32.
- Entomologist, The* (British Trust for Entomology): vol. 2 1864†*.
- Entomologists' Annual*: 1855-74. n.l.p.
- Entomologists' Gazette*: vol. 1 1950†*.
- Entomologists' Monthly Magazine*: vol. 1 1864†*.
- Entomologists' Record and Journal of Variation*: vol. 1 1890†*.
- Entomologists' Weekly Intelligencer*: vol. 1 1856 (vol. 2 1856-57) vol. 10 1861 n.l.p.

- Essex Bird Watching and Preservation Society Report*: 1950†.
- Essex Field Club: see *Essex Naturalist*.
- Essex Naturalist* (Essex Field Club): vol. 18 1914†.
- Fair Isle Bird Observatory Report*: no. 1 1949 (nos. 3-6 1951-54)†.
- Fauna Fennica* (Societis pro Fauna et Flora Fennica): no. 1 1947 (no. 5 1951; nos. 9, 10 1961)†.
- Field Studies* (Field Studies Council): vol. 1 1949†.
- Field Studies Council Report*: 1948 (1950/51)†. See also *Field Studies*.
- Flora Fennica* (Societis pro Fauna et Flora Fennica): no. 2 1959†.
- Geologists' Association Circular*: no. 657 November, 1963†. *Proceedings*: vol. 17 1901 (vol. 21 1909)†. Index: vols. 1-20; 31-60.
- Gerfaut, le* (l'Institute Royal des Sciences Naturelles de Belgique): vol. 32 1942†.
- Gibraltar Point Bird Observatory Report*: 1950-53; 1965†. See *Lincolnshire Bird Report* for 1954-64.
- Giervalk de*: see *Gerfaut, le*.
- Habitat* (Council for Nature): vol. 1 1965†.
- Hastings and East Sussex Naturalist* (Hastings and St. Leonards Natural History Society): vols. 2-6 1912-1945.
- Hastings and St. Leonards Natural History Society: see *Hastings and East Sussex Naturalist*.
- Hertfordshire and Middlesex Trust for Nature Conservation Ltd. Newsletter*: no. 1 1964†.
- Hertfordshire Natural History Society Transactions*: vol. 19 1930†.
- Ibis* (British Ornithologists' Union): vol. 1 1907†*.
- Imperial Chemical Industries: see *Endeavour*.
- International Zoo Yearbook* (Zoological Society of London): nos. 3-6 1963-66.
- Irish Naturalists' Journal*: vol. 2 pts. 2-12 1928-29; vol. 3 pts. 1-11 1930-31; vol. 8 pts. 3-7, 9-12 1943-46; vol. 9 pts. 3, 5-12 1947-49; vol. 10 pts. 1-11 1950-52.
- Isle of May Bird Observatory Report* (reprinted from *Scottish Birds*): 1956 (1962)†.
- Isle of Wight Natural History and Archaeological Society Proceedings*: vol. 1 1920†. *Bird Report*: 1963-64.
- Kent Bird Report* (Kent Ornithological Society): no. 1 1952†.
- Kent Field Club Transactions*: vol. 1 1957†. *Bulletin*: no. 5 1960†.
- Kent Ornithological Society: see *Kent Bird Report*.
- Kettering and District Naturalists' Society and Field Club: *The First Fifty Years* 1955.
- Lancashire and Cheshire Fauna Committee Report*: 1929 (1942 pt. 2) 1948.
- Leicestershire and Rutland Ornithological Society: see *Birds of Leicestershire and Rutland*.
- L'Institute Royal des Sciences Naturelles de Belgique: see *Gerfaut, le*.
- Lewisham Natural History Society: see *Darenthis*.
- Lichenologist, The* (British Lichen Society): vol. 3 pt. 2 1966†.
- Lincolnshire Bird Report* (reprinted from *Lincolnshire Naturalists' Union Transactions* and in some years containing *Gibraltar Point Observatory Report*): 1955 (1956; 1959; 1961)†.
- Linnean Society of London Proceedings*: vol. 150 1937-38 (vol. 143 pt. 2 1930; vol. 145 pt. 1 1931; vol. 151 pt. 2 1938; vol. 153 pts. 1, 2 1940)†.
- Transactions*: vol. 29 pt. 3 1875; vol. 30 pts. 2, 3 1874-75. Series 3 vol. 1 pt. 3 1955. *Botany*: vol. 29 nos. 202, 203 1893; vol. 48 nos. 323,

- 325 1930-31; vol. 49 1932-33; vol. 50 1935-37; vol. 51 nos. 337-9 1937; vol. 52 nos. 341, 343-7, 1937-45; vol. 53 nos. 348-9 1946-52; vol. 55 nos. 356, 361 1953-56; vol. 58 nos. 371-2, 374-5 1962-64; vol. 59 nos. 376-9 1964-66. *Zoology*: vol. 12 nos. 57, 63 1874-76; vol. 20 nos. 116, 123 1886-89; vol. 23 nos. 141-44, 146-47 1889-91; vol. 24 nos. 153, 156 1892-93; vol. 33 no. 223 1916.
- London Bird Report* (London Natural History Society): no. 1 1936†.
- London Natural History Society Ornithology Section Bulletin*: no. 1 1957†.
- London Natural History Society Transactions*: 1914-20. See also *London Bird Report*; *London Natural History Society Ornithology Section Bulletin*; *London Naturalist*.
- London Naturalist* (London Natural History Society): no. 1 1921†.
- Lundy Field Society Report*: no. 1 1947 (no. 5 1951, no. 15 1962)†.
- Mainly About Wildlife and the Countryside*: no. 25 1966†.
- Mammal Society of the British Isles Bulletin*: no. 1 1954†. Index 1959-63.
- Merseyside Naturalists' Association Bird Report*: 1951†.
- Middle Thames Natural History Society: see *Middle Thames Naturalist*.
- Middle Thames Naturalist*: no. 1 1947 (no. 5 1952)†.
- National Audubon Society of America: see *Audubon*; *Bird Lore*.
- Natural History* (American Museum of Natural History): c.c.
- Naturalist, The* (Yorkshire Naturalists' Union): nos. 198-205, 207, 209 1892; 1906†*.
- Naturalists' Journal and Guide*: vols. 4-9 1895-1900 n.l.p.
- Nature Conservancy Report*: 1949†.
- Nature Notes* (Selborne Society): vols. 1-12 1890-1901 n.l.p.
- Nedeslandshe Ornithologische Unie: see *Ardea*.
- New Biology* (Penguin Books Ltd.): no. 1 (7-30) n.l.p.
- New Flora and Silva*: vol. 5 pts. 1-3 1932-33.
- News for Naturalists* (Council for Nature): vol. 1 1959†.
- Norfolk and Norwich Naturalists' Society Transactions and Sectional Reports*: vol. 12 pt. 3 1926†.
- North Eastern Bird Banding Association, U.S.A.: see *Bird Banding*.
- North London Natural History Society Transactions*: 1914 (now London Natural History Society).
- North Staffordshire Field Club (University of Keele) Transactions and Field Studies*: vol. 73 1938†.
- North Staffordshire Field Studies*: see North Staffordshire Field Club.
- Northumberland, Durham and Newcastle upon Tyne, Natural History Society of, Transactions and Papers*: 1904 (vol. 1 pt. 2 1906)†.
- North Western Bird Report*: see *Merseyside Naturalists' Association Bird Report*.
- North Western Naturalist*: vols. 6-26 1931-55 n.l.p.
- Ornithologist, The*: vol. 1 1896-97 n.l.p.
- Oxfordshire Ornithological Society Report on the Birds of Oxfordshire and Berkshire*: 1915 (1934-36)†.
- Penguin Books Ltd. see *New Biology*; *Penguin Science Survey*; *Science News*.
- Penguin Science Survey* (Penguin Books Ltd.): 1961; 1963; 1965; 1966B.
- Portland Bird Observatory Report*: no. 1 1963†.
- Progress* (Unilever Ltd.): vols. 40-50 1948-64. Index 1948-60.
- Province of Quebec Society for the Protection of Birds Report*: no. 29 1946 (no. 31 1948)†.
- Reading Ornithological Club Report*: no. 1 1947†.

- Royal Horticultural Society Journal*: vol. 71 pt. 2 1946 (vol. 71 pts. 7, 9-12 1946; vol. 82 pt. 12 1957; vol. 84 pts. 8-10 1959; vol. 85 pts. 3-7, 9 1960; vol. 86 pts. 1, 2, 9 1961; vol. 91 pt. 7 1966) vol. 91 pt. 11 1966.
- Royal Society for the Protection of Birds Annual Report*: c.c. See also *Birds*; *Bird Notes*.
- Ruislip and District Natural History Society Journal*: no. 1 1951†.
- Rye Meads Ringing Station Report*: no. 1 1961†.
- St. Agnes Bird Observatory Report*: no. 1 1957†.
- Sandwich Bay Bird Observatory Report*: no. 1 1962†.
- Scarborough Field Naturalists' Society: vol. 1 1953 *Geology and Botany Reports*.
- Science News* (Penguin Books Ltd.): nos. 1-54 Index. n.l.p.
- Scottish Birds* (Scottish Ornithologists' Club): vol. 1 1962 †*.
- Scottish Naturalist*: 1871 (1883-1927; 1937-39) 1957.
- Scottish Ornithologists' Club: see *Edinburgh Bird Bulletin*; *Scottish Birds*.
- Sea Bird Bulletin* (See Bird Group): no. 1 1965.
- Sea Bird Group: see *Sea Bird Bulletin*.
- Selborne Society: see *Nature Notes*.
- Sidcup Natural History Society Journal*: no. 14 1963.
- Skokholm Bird Observatory Report*: 1937 (1938-46; 1949; 1951; 1953; 1954; 1956; 1959)†.
- Smithsonian Institute Washington D.C. *Reprints from Proceedings* (incomplete): vol. 79 1932†. *Bulletin*: vol. 170 pt. 2 1938; vol. 176 1940; vol. 179 1942; vol. 182 1946; vol. 185 pt. 6 1957; vols. 190-1 1946; vol. 195 1948; vol. 196 1949; vol. 197 1950; vol. 200 1952; vol. 203 1953; vol. 208 1955; vol. 209 1957; vol. 211 1958; vol. 212 1958; vol. 216 1959-62; vol. 217 1960; vol. 221 1961; vol. 226 1963. *Contributions from the United States National Herbarium*: vol. 29 pts. 1, 2 1944-45; vol. 31 pt. 3 1958; vol. 32 pts. 1, 4 1955 and 1963; vol. 34 pt. 2 1963; vol. 35 pts. 1, 2 1960-61; vol. 36 pts. 1, 2 1960-61; vol. 37 pt. 1 1962; vol. 38 pt. 1 1963.
- Société Guernesaise Report and Transactions*: 1923 (1924-25; 1927) 1938.
- Société Jersiaise Ornithological Extracts*: 1954 (1964-65)†.
- Societas pro Fauna et Flora Fennica Helsinki: *Acta*: no. 72 1955†. *Memoranda* no. 40 1963†. See also *Acta Botanica*; *Acta Zoologica*; *Fauna Fennica*; *Flora Fennica*.
- Society for British Entomology Journal*: vols. 1-6 1934-59 n.l.p. *Transactions*: vol. 1 1934 (vol. 14 pt. 6-vol. 16 1961-66)†.
- Somersetshire Archaeological and Natural History Society Ornithology Section Report*: nos. 11-32 1924-45.
- South Eastern Bird Report*: 1934-47 n.l.p.
- South Eastern Naturalist and Antiquary* (South Eastern Union of Scientific Studies): vol. 3 1898 (vol. 4 1899)†.
- South Eastern Union of Scientific Studies: see *South Eastern Naturalist and Antiquary*.
- South Essex Natural History Society: see *South Essex Naturalist*.
- South Essex Naturalist* (South Essex Natural History Society): no. 1 1951 (no. 5 1955; no. 12 1962) no. 14 1964. 21st Anniversary Edition 1934-55.
- South London Entomological and Natural History Society Proceedings*: 1884†.
- South London Field Studies Society Journal*: no. 1 1963†.
- Spurn Bird Observatory Report*: 1965†.

- Suffolk Naturalists' Society Transactions*: vol. 1 1929 (vol. 9 pt. 1 1954)†.
 Surrey Bird Club: see *Surrey Bird Report*.
Surrey Bird Report (Surrey Bird Club): no. 2 1954†.
Sussex Bird Report (Sussex Ornithological Society): no. 15 1962†.
 Sussex Ornithological Society: see *Sussex Bird Report*.
Torquay Natural History Society Transactions: vol. 4 1922†.
Tory Island Bird Observatory Report: no. 1 1958†.
 Trent Valley Bird Watchers (Nottinghamshire): see *Birds of Nottinghamshire*.
 Unilever Ltd. See *Progress*.
 University of Keele: see North Staffordshire Field Club.
Vasculum, The: vols. 1-26 pt. 2 1915-40.
Watsonia (Botanical Society of the British Isles): vol. 1 1949†.
West Midlands Bird Club Report (Birmingham and West Midlands Bird Club): 1945†.
Wild Life: vols. 1-7 1913-17 n.l.p.
Wild Life Observer (Council for Nature): October, 1964-March 1966 n.l.p.
Wimbledon Natural History Society Journal: vols. 1-7 no. 3 1933-39 all parts published.
 Yorkshire Naturalists' Union: see *Naturalist, The*.
 Zoological Society of London: see *International Zoo Yearbook*.
Zoologist, The: no. 1 1843 (Jan., Feb. 1914) no. 906 1916 n.l.p.

COVENANTS

A message to all members:

Did you know that provided you pay income tax at the standard rate (at present 8s. 3d.) a 30s. subscription can become £2 10s. 0d. to the Society if you will covenant your subscription? If you intend to remain a member of the Society for the next seven years then please fill in a covenant form. There is no extra cost to you. You will be asked to sign a revenue form once a year. It will take you just a minute. One minute per year for 7 years = 7 minutes. Seven minutes means £7 to the Society. Please ask for a Covenant application form either direct from the Treasurer, 40 Frinton Road, Kirby Cross, Frinton on Sea, Essex, or from the General Secretary.



Instructions for Contributors

PAPERS should be submitted to the EDITOR (address in Programme) note later than the middle of February if they are to be considered for publication in the same year. They should be typed, with double spacing and a wide margin, on one side only of quarto paper. Submission in duplicate facilitates the essential process of refereeing. It also helps the Editor if the total number of words is pencilled in at the head of the paper.

Scientific names should be underlined, but headings and sub-headings only in pencil if at all. References should be listed at the end, in alphabetical order of authors' names, in the following standard form:—

MATTHEWS, L. HARRISON, 1952, *British Mammals*, London.

YOUNG, G. W., 1905, The Chalk Area of North-East Surrey. *Proc. Geol. Assoc.*, 19, 196-206.

The corresponding references in the text would be (Matthews, 1952) and (Young, 1905).

Dates should be in the form June 9, 1964.

Line drawings should be submitted separately, in Indian ink on thick white paper or card, preferably 2× or 3× the size finally intended. Any lettering must be large enough to be clear when reduced, and all lines must be solid black, not pale or imperfect. Legends should be typed separately as they will be set up by the printer. The Editor should be consulted in good time if there is any doubt about the preparation of illustrations. Photographs can be accepted only after prior consultation.

Galley proofs will be sent to authors for scrutiny, but only essential corrections can be made at that stage.

Up to 25 free reprints will be supplied on request.

All enquiries for advertising space in

**THE
LONDON NATURALIST
AND
THE
LONDON BIRD REPORT**

should be addressed to :

**ERIC J. FURSE,
Devonia, Durham Road, Bromley, Kent
RAV 4922**

Statement of Accounts for the

1965		Receipts		GENERAL	
£	s. d.			1966	£ s. d.
1,869	18 5	Subscriptions Current ...	...	1,945	17 1
13	10 0	Subscriptions Arrears ...	...	23	4 0
36	15 0	Subscriptions Advance ...	...	41	10 0
45	15 0	Entrance Fees ...	...	52	5 0
<hr/>				<hr/>	
1,965	18 5			2,062	16 1
163	10 0	Donations ...	...	114	17 0
2	12 6	Interest £75—3½% War Stock ...	...	2	12 6
5	8 0	Interest £180—3½% Savings Bond 60/70 ...	...	5	8 0
159	19 7	Interest Deposit Account ...	...	149	13 1
<hr/>				<hr/>	
104	6 9	Bird Film Receipts ...	...	157	13 7
—	— —	Sundries ...	...	94	5 9
40	5 11	Balance in Hand 31.10.65 ...	...	15	4 5
<hr/>				<hr/>	
£2,442	1 2			£2,496	1 6

		PUBLICATIONS	
82	16 3	Sale of Publications ...	111 15 7
100	0 0	Grant from Royal Society ...	— — —
53	18 0	Advertisements ...	29 16 0
—	— —	London Bird Report No. 29 Reserve ...	500 0 0
106	17 0	Less: London Bird Report No. 29 cost ...	490 17 1
<hr/>			<hr/>
1,336	19 0	Transferred from General Account ...	9 2 11
<hr/>			<hr/>
£1,680	10 3		1,316 9 9
<hr/>			<hr/>
			£1,467 4 3

Additional Revenue from the Covenant Scheme has not yet been received from the Inland Revenue Amounts received under 1965/66 scheme will be shown in accounts for 1966/67, those for 1966/67 in 1967/68 and so on.

		LIBRARY AND	
200	0 0	Balance 31.10.65 for Printing Catalogue ...	200 0 0
30	5 6	General account grant for Books ...	19 1 9
<hr/>			<hr/>
£230	5 6		£219 1 9

		PREMISES	
1,450	0 0	Balance 31.10.65 ...	1,500 0 0
—	— —	Transfer from General account Interest ...	90 0 0
50	0 0	Transfer from General account ...	110 0 0
<hr/>			<hr/>
£1,500	0 0		£1,700 0 0

		LIFE COMPOSITION	
		Balance 31.10.65 ...	400 0 0

		"BIRDS OF LONDON (Ornithological)	
8	18 3	Royalties on 2nd Edition ...	18 17 9
5	3 2	Interest 1966 ...	6 18 10
154	16 11	Balance 31.10.65 ...	168 18 4
<hr/>			<hr/>
£168	18 4		£194 14 11

Audited and found correct
January 23, 1967

Year Ended October 31, 1966

ACCOUNT

1965		Payments								1966		
£	s. d.									£	s. d.	
258	7 6	Hire of Rooms and Hall	...	...	...	...	...	...	...	274	17 0
20	12 6	Bookham Common Research Centre	...	...	...	...	...	...	...	3	18 6
235	15 11	Printing and Stationery	...	...	...	...	...	...	...	44	13 3
200	0 0	General Secretary Honorarium	...	...	...	...	...	...	...	200	0 0
31	11 0	General Secretary Telephone	...	...	...	...	...	...	...	29	2 2
39	2 0	Subs to other Societies	...	...	...	...	...	...	...	38	7 0
105	7 0	Sectional Grants and Expenses	...	...	...	...	...	...	...	113	15 11
58	13 1	Postages ...	...	...	...	...	...	...	...	55	4 8
21	4 4	Sundries ...	...	...	...	...	...	...	...	24	17 10
2	18 8	Bird Film Payments	...	...	...	...	...	...	...	35	10 4
30	5 6	Grant to Library Accounts	...	...	...	...	...	...	...	19	1 9
1,336	19 0	Grant to Publications Account	...	...	...	...	...	...	...	1,316	9 9
—	—	Transfer to Premises Account—Int. £90 0s. 0d.—	—	...	...	...	...	...	...	200	0 0
50	0 0	Transfer to Premises Account—£110 0s. 0d.—	—	...	...	...	...	...	...	200	0 0
51	4 8	Balance in hand 31.10.66	...	...	...	...	...	...	...	140	3 4
<hr/>												
£2,442 1 2												
<hr/>												
£2,496 1 6												
<hr/>												

ACCOUNT

164	2 6	Programme 1966	...	...	...	...	...	...	...	182	15 0
853	15 3	London Naturalist No. 45	...	...	...	...	...	...	...	627	13 10
500	0 0	London Bird Report No. 30 Reserve	...	...	...	...	...	...	...	500	0 0
70	1 2	Addressing and Wrapping	...	...	...	...	...	...	...	56	5 6
92	11 4	Postages ...	...	...	...	...	...	...	...	100	9 11
<hr/>											
£1,680 10 3											
<hr/>											
£1,467 4 3											
<hr/>											

COLLECTION ACCOUNT

30	5 6	Purchase of Books	19	1 9
200	0 0	Balance 31.10.66 for Printing Catalogues	200	0 0
<hr/>											
£230 5 6											
<hr/>											
£219 1 9											
<hr/>											

ACCOUNT

1,500	0 0	Balance 31.10.66	1,700	0 0
<hr/>											
£1,500 0 0											
<hr/>											
£1,700 0 0											
<hr/>											

ACCOUNT

Balance 31.10.66	400	0 0
<hr/>											
400 0 0											
<hr/>											

AREA" BOOK ACCOUNT

Section)

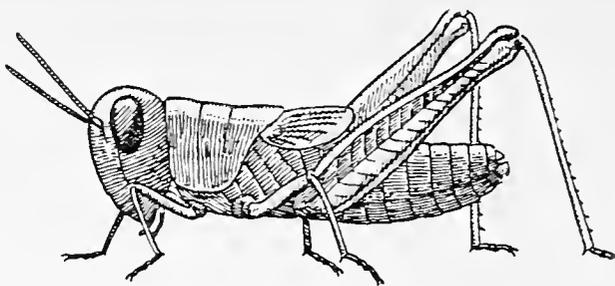
168	18 4	Balance on Deposit account 31.10.66	194	14 11
<hr/>											
£168 18 4											
<hr/>											
£194 14 11											
<hr/>											



R. W. HALE, *Hon. Auditor.*
 H. B. CAMPLIN, *Hon. Auditor.*
 A. J. BARRETT, *Hon. Treasurer.*

FREDERICK WARNE

1-4 Bedford Court,
Strand, London, WC2



INTRODUCING THE INSECT

An ideal introduction to this fascinating subject, giving information on how to start an insect collection, including a chapter on anatomy and life history. Also a most comprehensive guide to classification and identification, numerous delicate but detailed line drawings. F A Urquhart. 31s 6d net.

FRESHWATER LIFE OF THE BRITISH ISLES

This standard work of reference on the plants and the vertebrate animals of ponds, lakes, streams and rivers has been extensively revised and is simple, explicit and lavishly illustrated. This third edition is intended for the student and for the general reader. John Clegg. 37s net.

OBSERVER'S POND LIFE

A new revised edition of this remarkable comprehensive little book, it describes briefly something of the almost incredible wealth and variety of plants and animal life in ponds and streams. There are also sections on collecting methods and on the ecology of freshwaters. Fully illustrated. John Clegg. 6s net.

Other books of interest are **Grasshoppers, Crickets and Cockroaches of the British Isles**, **The Standard Natural History**, **Rotifers**, **The Bulb Book** and many more Wayside and Woodland books.

Illustrated leaflets available on request

UNIVERSITY OF LONDON
EXTENSION COURSES
Beginning end of September 1966

Courses are being arranged in

Natural History

Biology

Botany

Zoology

Ecology

Geology

Biochemistry

Further information available in late July from the Deputy
Director (Extension), Department of Extra-Mural Studies,
7 Ridgmount Street, W.C.1.

THE BOTANICAL SOCIETY
OF THE BRITISH ISLES

30s. a year - Ordinary Membership

15s. a year - Junior (*under 21*) Membership

PROSPECTUS AVAILABLE ON APPLICATION

**MEMBERSHIP IS OPEN TO ALL INTERESTED
IN BRITISH BOTANY**

All enquiries should be addressed to the Hon. General Secretary:

D. E. ALLEN, c/o DEPT. OF BOTANY,
BRITISH MUSEUM (NATURAL HISTORY),
CROMWELL ROAD, LONDON, S.W.7.

